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COMPUTER WEEKLY

# 'Amicable agreement' in copyright skirmish

AN "amicable and mutually satisfactory agreement" has been reached between Clive Sinclair, originator of the ZX80 "£100 computer" (CW, February 7), and Chris Cary of Compshop, who was prevented by a recent court order from marketing a cheaper copy of the machine, called MicroAce.

Sinclair is to get 5% royalty on sales of MicroAce, which is to be marketed only in the US in a kit form. The agreement also allows MicroAce to follow Sinclair's design more closely than at present.

Sinclair seemed to be satisfied with the outcome of the case under current British copyright law. "We acted swiftly and correctly and it turned out well. We will not have our products copied, and that point has been effectively made."

The judge had prevented Compshop and Product Launch from promoting the MicroAce as the keyboard was similar to that of Sinclair's ZX80. Although the design inextricably linked the ROM and the keyboard, the ROM was ignored at the first hearing as being not immediately visible, and was in any case not identical to the ZX80 at byte level.

"We had a bit of a skirmish, which should put people off copying ROMS," said Cary, "but it appears that ROM isn't copyrightable. Perhaps one day a law will be made, but we didn't want to be the British test case — it would have taken up too much time and money.

"At the end of the day we were just a couple of engineers trying to make a buck, not a pair of gangsters," he added, "so we came to an amicable agreement."

Although this particular skirmish is settled, the case is bound to add fuel to the controversy over software copyright.

## NEWS IN BRIEF

### Viewdata deal for CAP Sogeti

THE contract to implement France's electronic telephone directory project, which is planned to put all 34 million telephone subscribers on viewdata for free by 1992, has gone to software house CAP Sogeti Logiciel as main contractor.

CII Honeywell Bull and Matra-TRT are to provide the hardware.

### Hughes-ITT link

HUGHES Aircraft and ITT have set up a joint company called Tadcom to develop terminals for use by the US forces in the joint tactical information distribution system planned for the mid-1980s. The system aims to provide secure voice and data communication using digital transmission techniques that are resistant to jamming or interception.

### UN deal for IBM

IBM has won a UN Development Program contract for 16 4300s for collecting census data in China. Worth $9.8 million, the contract is for a central 4341 at the Peking bureau of statistics and a network of 4300s, one in each of the 15 provinces of the People's Republic.

### System X men out

OVER 2,000 System X development engineers have been suspended without pay by GEC Telecommunications at Coventry following a strike by six key men in pursuit of a pay claim by ASTMS of 22% plus other benefits. GEC has offered 17% with conditions including some shift work and the use of CAD.

# Canadian chips from PO and GEC-Marconi

CANADIAN telecommunications manufacturer Mitel has licensed British Telecom (a part of the Post Office) and GEC-Marconi to make VLSI integrated circuits using its proprietary ISO-CMOS technology.

Plessey is also expected to take a licence on the technology.

British Telecom is to develop prototype devices at its Martlesham Heath laboratory and establish, in consultation with industry, standards for use in telecommunications and other systems.

Marconi and Plessey are to produce devices for their own consumption and for the world market.

ISO-CMOS is a technique which uses silicon dioxide instead of reverse biased P-N junctions to isolate transistors from each other in the complementary pair configuration of CMOS circuits. And polysilicon is used for transistor gates and electrical interconnections.

These two features increase transistor packing densities and allow devices to run at up to 50 megahertz while reducing power consumption.

They also allow both analogue and digital functions to be carried out on the same chip.

GEC research director Derek Roberts rates the technology the best available. GEC-Marconi is to build a factory near Lincoln to produce ISO-CMOS in about a year.

British Telecom is currently spending £5 million a year on semiconductor design and development and has electron-beam and photolithographic equipment suitable for ISO-CMOS production.

# Receiver called in by Nascom creditor

AFTER failing to find alternative backers, or to persuade Gravewood Securities to increase the £500,000 loan it made last year, Nascom Microcomputers has asked Gravewood, its major creditor, to call in a receiver.

Nascom attributes its failure to slow recovery of development costs and delays in the supply of components.

A spokesman for W. H. Cork Gully, who have been appointed receivers, said it was too early to say why Nascom had run into trouble, but the company was continuing to trade and was still selling products.

There were no redundancies and prospects of finding a buyer were good, he said.

The committee of the International Nascom Microcomputer Club, the user group that was run with secretarial support from the company, have all resigned, but committee members hope to continue to produce the INMC newsletter and to resume their functions if support becomes available from whoever buys the company.

# Wanted—16,000 DP staff

A NATIONAL focus of responsibility for training computer staff and forecasting manpower needs in the industry, preferably based on the Engineering Industry Training Board, is essential if economic development is not to continue to be held up by shortage of computer staff. That is the main recommendation of the Manpower Sub-committee of the Neddy Computer Sector Working Party which has now produced its final report after three years' discussion.

An investigation commissioned by the sub-committee from the Institute of Manpower Studies reveals that there is now a shortage of 18,000 analysts and programmers and 8,000 electronic and control engineers in the UK. This does not allow for the "multiplier effect", that economic development in the country as a whole has been "significantly held back" by the shortage, and so otherwise the need for staff would have been even higher. About 500 programmers a month will continue to be needed.

The 6,000 engineering vacancies compares with the output figure of 2,000 a year coming from the colleges and universities.

Other recommendations the sub-committee makes include: Expansion of computer education, both general and vocational, including boosting the Initial Programming and Real Time Programming schemes and the TOPS and Threshold programmes; increased taking on by employers of their existing staff for training (new technology agreements should help with this); further investigation of techniques to improve programmer productivity; increased co-ordination between Industry Training Boards.

Another recommendation is that selection procedures for trainees should be reviewed to avoid "qualification overkill". Sometimes degrees and other qualifications are demanded when they are not necessary.

The Engineering Industry Training Board needs to be enhanced, with its role extended, the sub-committee says.

The chairman of the sub-committee, Ian Benson of white-collar union AUEW-TASS, said that he did not think increased salaries in computing would alleviate the staff shortage much.

### Brussels group buys Lowndes Ajax bureau

THE Brussels-based computer services group, Centre Informatique Générale, has bought the Lowndes-Ajax bureau from the Hill Samuel Group for a cash sum of nearly £3 million. Talks between CIG and Hill Samuel about a takeover of Lowndes-Ajax started early this year (CW, February 21).

The assets of Lowndes-Ajax include its IBM based bureau centre at Croydon, while CIG owns bureau operations in Spain, Portugal, Brazil and Argentina in addition to its big IBM based centre in Brussels.

# Freudian progress in patient interviews

AN interviewing system called Freud, developed on Commodore Pet hardware at the University of London's Institute of Psychiatry, is taking a new approach to patient interviewing.

In design Freud differs considerably from Mickie, the questionnaire system developed at the National Physical Laboratory by a team led by the late Dr Chris Evans (CW Feb 1978). Where Mickie presents questions that are simply answered yes or no on the keyboard, Freud gives a multiple choice menu designed to allow flexibility for doctors and patients.

The launch of Freud at this show in Wembley tomorrow (Friday) comes as a marketing organisation, Ables Informatics, is set up to sell the hitherto unchallenged Mickie.

The new company sells Mickie on SWTP hardware for £2,700 upwards. Freud, marketed by Medicom, the London-based medical systems specialists, costs £400 for software and runs on a standard Pet costing about £2,000.

Interviewing by computer is a technique which would apply in areas such as personnel, law and insurance as well as medical. It saves time and expertise while ensuring that interviewees are not embarrassed or affected by the mood and presence of the other person.

# IBM rushes ahead with H

● From front page

IBM is reported to have had cooling problems on the ECL chips for the H-series, but Fertig says that these are now solved. The circuits are said to have 500 elements per chip, with between 80 and 100 mounted on a 10 cm square ceramic substrate.

Fertig will be in London next month to give an updated rerun of his Future Systems forum. This has been organised by Advanced Computer Technology of New York, where Fertig is a senior consultant, and Online.


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## Briefing

### TUC seeks deal with CBI

THE TUC is aiming to reach a joint agreement with the Confederation of British Industry over a policy to promote the advancement of technology.

There would be a joint public condemnation, the TUC hopes, of restrictive and deflationary policies which hold back development, and a call on governments to stimulate growth.

### 32-bit chip advance

SYSTEMS Engineering Laboratories has announced what is said to be the industry's first true 32-bit word super minicomputer based on a single slot central processor. Called the Concept/32 the machine also incorporates a single slot I/O processor and a single slot memory board called the Integrated Memory Module that holds 256K-bytes of MOS memory.

### Univac gets vote

AN ORDER worth £1.5 million has been placed with Univac by Merseyside County Council for an 1100/81 system with online and real time facilities to replace an ICL 1904S. Database and distributed communications applications are planned. ICL, IBM and Honeywell all competed for the contract.

### FBI probe at IBM

AN IBM employee, a computer and more than $100,000 are involved in an FBI investigation at IBM's offices in Springfield, Missouri. IBM confirms the investigation but will say no more, and the FBI describes the case as "routine robbery."

# Martlesham Medal for 'Colossus'

DESIGNER of Colossus, Dr Tommy Flowers, has been awarded the first Martlesham Medal, instituted by British Telecom to reward outstanding contributions to telecommunications development.

In 1943 Flowers built the Colossus code-breaking machine which is now generally recognised as being one of the first computers. It was programmable via a bank of switches and used 2,400 thermionic valves.

At the presentation Flowers, now 74, met the maker of the machines whose codes he helped to break. Boris Hagelin, a Russian-born Swede, now 88, designed the Hagelin cadamakers, which had been built in Sweden since 1934, and ended up being used by both sides during the war.

As a research worker at the Post Office's Dollis Hill laboratory, Flowers had made his expertise in switching available to the government's Bletchley Park Communications Headquarters.

● Dr Flowers is pictured receiving the first Martlesham Medal from Sir William Barlow (centre). On the right is Boris Hagelin.

# ICL bids for share of world PC market

WITH the aim of becoming a major world-wide supplier of multi-layer printed circuit boards, ICL has launched a new marketing operation to exploit the capabilities of its highly productive multi-layer PC board manufacturing operations at Plymouth Grove, Manchester and Kidsgrove, Staffs.

ICL claims that it now has more than 50% of the fine line multi-layer PC board production in the UK and has set up an operational division called ICL Logiclayer within its manufacturing group to handle the manufacture of all PC boards for its own computers as well as for outside customers.

Personnel include 900 staff and a marketing team which has already picked up orders worth £400,000 from outside customers. Outside business is expected to be worth £5 million by 1982.

ICL says that multi-layer boards now account for 90% of its PC board production and that the most complex boards now contain up to 22 individual layers.

### $1,800 million damages against AT&T

MCI Communications Corp has won record punitive damages of $1,800 million against AT&T for allegedly impeding its growth between 1971 and 1975. MCI provides a cut-price long-distance telephone service based on microwave links, but depends on AT&T's local network to reach its customers.

In 1971 the Supreme Court ordered AT&T to provide links to MCI plant, but MCI claims that AT&T often refused to provide them or was unco-operative.

AT&T says it will appeal the decision.

### Bradford backing

BRADFORD Metropolitan Council is backing a microprocessor power supply manufacturer, Microvitec, in a project for building microcomputers and display terminals. Bradford has set aside £500,000 worth of buildings and land for Microvitec which plans to have 300 staff within two years.

### Infoline deal

AGREEMENT has been reached on the takeover of Infoline, the online information service, by Pergamon Press (CW, June 12). The purchase will provide Infoline with £500,000 injection. Two of the existing shareholders, the Department of Industry and Derwent Publications, are to withdraw.

# 303X boost to delay H-series

ANNOUNCING substantial enhancements to the 303X line, as forecast in Computer Weekly last week, IBM has given a strong indication that the H-series launch has been put back to some time next year. The announcements include the large-scale Coronado disc drive, now called the 3380, and new releases of MVS supporting up to 32 megabytes on 3033 multi-processor configurations. The previous maximum was 16 megabytes.

Most striking feature of the announcements is the long lead times: the 3380 disc drive is set for September 1981, the new release of MVS for January 1981, extended addressing on 3033MPs for December 1981, and the speed matching buffer for attachment of 3380 discs to 370/158s and 168s will not be available until spring 1982.

Amdahl has responded to the 32 megabyte memory limit by saying that its V/7 and V/8 models were designed for more than 32 megabytes, and that a 32 megabyte 470V/8 is already running in Sunnyvale.

Other items in the IBM announcement are a 3375 800 megabyte disc drive, and a 3814 controller which allows up to four peripheral controllers to be switched between up to eight channels or vice versa. The 3814 is said to allow more efficient management of large installations.

The announcement also includes a new model of the 3042 Attached Processor for 3033 installations. Previously APs have made use of the main processor

● Turn to page 11

# Change of plan for Inmos denied

THERE seems to be little chance of Industry Minister Sir Keith Joseph or Mrs Thatcher reaching any decision on the future of Inmos this week. Suggestions that the company may be persuaded to change its plan to set up its first UK factory at Bristol and move across the Severn to South Wales have been denied. Meanwhile the review of the project now being carried out by the National Enterprise Board is said to be "routine". It considers that as it first approved the grant of a second £25 million for Inmos six months ago, and as the government has not yet acted on that recommendation, it is necessary to take a further look at the company.

There is at present no indication that the board is likely to change its view, but for its part Inmos is now preparing plans for the next year and for five years ahead, and is taking into

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## COMPUTERVIEW

# The quiet revolution

DR GENE AMDAHL's thesis that the mainstream computer business of the near future will live in an IBM software world, regardless of who supplies the hardware, looks like coming true even faster than he imagined. A quiet revolution is taking place in the IBM compatible business, one that has crept up almost unnoticed.

Companies are no longer satisfied simply to sell IBM compatible hardware and rely on the fact that most IBM system software is in the public domain to acquire the essential operating systems and utilities. Three companies are now selling or planning to sell systems complete with compatible or near compatible operating systems.

Siemens pioneered the approach with the large Fujitsu systems which it markets in West Germany and several other European countries as the 7,800 line. These machines are offered with the BS3000 operating system which is Fujitsu's OSIV/F4, which matches IBM's MVS and is claimed to be 99% compatible and between 10% and 20% more efficient.

Siemens' compatriot, Nixdorf, plans to follow suit with plug-compatible hardware and "super-DOS" operating systems from its new US acquisition, the Software Company of Richmond, Virginia. The pitch is that users are offered full compatibility to run their existing software without the risk that IBM will pull the rug out from under them by changing the software pricing rules.

The third such venture will come from the now TRW-Fujitsu company in the US which plans to sell Fujitsu mainframes, ranging from the M-130F to M-160F with the OSIV/F2 operating system which is said to be about 80% compatible with DOS/VS. Since the machines are built in 370 architecture, increasing the compatibility will not be an insuperable problem, at which point a third full alternative will be available to IBM users.

Already, IBM software rules the developed computer world with more than 50% of almost all major markets apart from the UK, France and Japan. But even in Japan, IBM software and its derivatives and copies reign supreme, since IBM, Fujitsu and Hitachi together have well over 60% there.

Dr Amdahl's thesis is that all computer manufacturers will eventually have to follow the IBM path, and the latest generation of machines from ICL, Honeywell and CII-Honeywell Bull indicate that all three are clearly keeping their options open, since the mid-range 2900s, the DPS-8 and the DPS-7 are all microcoded machines which could be adapted fairly cheaply to run IBM software.

Univac's 90 series VS/9 machines and Siemens' 7.000 series are both based at second-hand on IBM 360 architecture. The viable real alternatives in the medium and large-scale operating system world are ICL's VME/B and if it ever really takes off VME/K, Univac's OS/1100, Honeywell's GCOS-8, NCR's VRX and Burroughs' MCP. All look viable and competitive today. Whether they will do so in 1985 once the rising tide of IBM lookalikes reaches full spate is open to question.

The unfortunate aspect of the Amdahl theme is that many people believe that the IBM software standard is a very inferior one, and that it is vital that there should be real alternatives. Amdahl Corp has led the way in offering software enhancements which improve the performance of major IBM offerings such as VM/370 and IMS, while by rewriting MVS, Fujitsu has proved that it can be made to run significantly more efficiently.

The latest development is by no means good news for IBM itself, because by offering machines which are compatible with but not dependent on IBM software, Siemens and Nixdorf are making it much less attractive for IBM to change the rules, either by changing its licensing conditions or by introducing incompatible "nasties" in future operating system releases. To do so would simply lock their defecting customers out from the standard plug-compatible bolt-hole.

As Dr Gene Amdahl says in his most recent interview with Computer Weekly, it really looks as if IBM's hegemony is over (see page 9).

## LETTERS to the EDITOR

### Gilb's 'Blinkerthink' on human factors

I YIELD to no-one in my admiration for Tom Gilb, but the Mythodology headed "Towards a natural menu-driven language" (CW, April 17) did seem to me to exemplify a vice all too prevalent among writers and speakers on human factors in computing.

The vice in question might be called Blinkerthink; it consists in ignoring all work on the subject done outside one particular establishment or research group.

Gilb was at least blowing somebody else's trumpet; but is it really sensible to discuss "Behavioural Studies of the Programming Process" without any reference to the work of Max Sime at Sheffield, Tom Green at Cambridge, Brian Shackel, Ken Eason and their team at Loughborough, Mike Coombs at Liverpool, Ben Shneiderman and John Gannon at Maryland, Ed Youngs at Bell, David Embley at Illinois... etc, etc...?

Admittedly, it would be difficult to do justice to all this work in a single article, but some of it is very relevant to assessing the merits of the IBM work. Surely it would have been possible at least to mention its existence, so as to alert the reader to the fact that Yorktown Heights is not the only place where such expertise is to be found!

JULIAN NEWMAN
Heriot-Watt University,
Edinburgh.

### Modifications of code during execution of the program

I WOULD like to contend Professor Donald Michie's statement concerning the "conspicuous absence from all but a couple of experimental artificial intelligence languages of facilities for operating on code as data" (Privateview operating March 20).

One Ansi standard language, Mumps, available commercially on a variety of minicomputers, incorporates facilities specifically intended to permit modifications of code during the execution of the program.

The principal command used for this purpose is XECUTE, which operates on a string of data, interpreting it as Mumps code. The code/datastrings may be created and modified by the programs. In some, if not all versions, the argument of the XECUTE command may modify, or even completely delete, the program invoking it.

Using the code-modifying facilities of Mumps I have produced an interactive system to analyse highly complex information held on a database. The system interprets commands entered by the user and from these builds logically optimised routines to analyse the database, displaying the results on the user's terminal.

My purpose in using these techniques was to optimise the computation time and main memory usages. Nonetheless I believe these facilities and the extremely powerful data structures available under Mumps could readily be exploited for the purposes of artificial intelligence.

J. I. SANDER
Stephen Howe Consultants,
New Malden,
Surrey.

*I stand corrected by Mr Sander's communication, in which I am sure other readers will be interested. — DONALD MICHIE.*

*THE EDITOR welcomes letters commenting on subjects published in Computer Weekly, or on original topics. All letters must be accompanied by the writer's name and address, not necessarily for publication.*

### Freedom restricted

THE chairman of UKITO in his letter (CW, April 10) refers to the "cries of outrage" from US companies in the UK on the formation of his organisation. To whom is he referring? Honeywell neither feels nor has expressed outrage, and the public comments of other companies have been models of circumspection.

Indeed, it might well be said that we should be a good deal more indignant that central government computer users, soon to be free of single tender purchase as we have known it, have now to face in UKITO the possibility of new constraints on their freedom of equipment choice.

We might even feel a little indignant that long-standing British-bred companies, whose contribution to the British economy and to British computing dates back several decades, should be disqualified from membership of an organisation many of whose "truly British" members have yet to make an equivalent contribution in terms of investment, technology, export earnings and employment in this country.

However, let that pass. What should not be allowed to go by default, though, is the interest of the computer user and, regretfully, one sees little mention of that in UKITO's utterances to date.

D. J. CROFTS
Director,
Marketing Operations
Honeywell Information Systems,
Brentford.

### 1984 and all that...

THIS week's example of the strange things people say in the media about computers was sent in by Eric Rawcliffe of Keighley, W. Yorks, who wins £5.

**About six months ago Mr Bryant discovered that micro-computers could be bought for between £300 and £800. He now has three — a T.R.S. 80, a Sharp, and a Pet. Though only the size of a television set plus video recorder they are in no sense toys. In fact, due to the rapid advances in technology, they each have more power than the system used to send a man to the moon.**

*Keighley News and Bingley Guardian*


OVERPRICED COMPUTERS
INADEQUATE PERSONAL MICROS?

GOVERNMENT COMPUTER REQUIREMENTS

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RAF CARDINGTON
(Ref. No. CP 15/81/CW)
The Meteorological Research Unit at RAF Cardington (near Bedford) requires two mutually-compatible mini-computer systems, one to provide a remote job entry facility to the main Met. Office computer system (IBM 370/158 + 360/195) at Bracknell and the other to log data from a telemetry sub-system on 9-track magnetic tape...

Applications for copies of the Operational Requirements should be sent to the CENTRAL COMPUTER AND TELECOMMUNICATIONS AGENCY ... NORWICH NR3 1DW, quoting the appropriate Reference No. shown above. Completed proposals must be received not later than 17th July, 1980.

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# EEC wants comms net to sea ports

A DEADLINE of June 28 has been given for applications to tender for a pilot data communications network linking seven EEC sea ports. The pilot scheme is being organised by the European Ports Data Processing Association, the independent organisation part funded by the EEC Commission and based at Antwerp.

If the pilot system works successfully it could lead to dozens of sea ports all over the EEC being linked by a permanent network used to interchange data such as details of ship arrivals and departures and dangerous cargos.

The pilot system will be used to transmit messages between the seven ports advising on the imminent arrival of ships and it will also provide a central file of information on the ships involved.

The pilot scheme contract is worth £50,000 and details can be obtained from Robin Russell, Clydeport Data Management, Glasgow.

The sort of organisation that could tender for the contract might be a time sharing bureau or a systems house offering a minicomputer solution.

Firms tendering will be given until September 19 to prepare their bids and the project is scheduled to begin in December. Operation of the pilot system is expected to start six months later and run for 12 months.

## NEWS IN BRIEF

### Fujitsu buys WP division

BY far the most ambitious of the six Japanese computer companies, Fujitsu has staked its claim for a share of the world word processing market by buying the word processing division of US leasing company DPF Inc. DPF has been selling word processing software with large second-hand IBM 360 and 370 processors with a minimum of 10 and no maximum limit to the number of terminals attached (CW, August 3, 1978).

Fujitsu already sells some of its peripherals OEM in the US, and is putting together a 50-50 joint venture company with TRW to market smaller mainframes and business computers.

### Harris for college

HARRIS has won a £175,000 order from Slough College of Higher Education for a 550 mini to replace an ICL 1903 batch machine. The system will have 37 VDUs as well as links to existing micros and is the second Harris order to displace ICL at a college, following that from Lanchester Polytechnic (CW, December 6 1979).

### 37% pay claim

The Post Office Engineering Union has voted at its national conference to pursue a pay claim of 30% plus 7% for productivity. British Telecom has offered 15% plus 2% for productivity.

### £1.6m contract

A DUAL ICL 2972 system worth £1,690,000 is to be supplied to Edinburgh Regional Computing Centre to replace a 2970 and two System 4.75s. Edinburgh's own home-grown multi-access system, EMAS, will be used on the new equipment, supporting 170 terminals, almost twice as many as at present.

## Merrick is first

PETER MERRICK Associates, the firm set up by the former boss of the Lowndes-Ajax service company, is the first customer for the Prime Information System announced earlier this year by PRC International of Twickenham, Middlesex.

Peter Merrick will run a time-sharing service on a £100,000 1000. It will provide all-day use for a flat fee as an option. The service will include both data and word processing. In addition to running the time sharing service Peter Merrick hopes to sell Prime Information Systems to customers wanting their own in-house machine.

## Extel's business micro

EXTEL has introduced a commercial microcomputer system, the System 20, which runs under the CP/M operating system and costs £4,650 for the smallest configuration. It is built in the US by Digital Microsystems of Oakland, California and supersedes Extel's System 10, otherwise known as the Microfile.

Extel says compatibility with System 10 can be retained using the M-Basic developed by Microsoft of Washington DC which is available in the UK from the Computer Centre of Swansea.

Claudius packages, sold with System 10, have been adapted for the System 20.

It comes with at least 64K-bytes of main memory, two floppy disc drives and can be expanded with hard discs of 13.7 or 27.4 megabytes.

# Intel chief tells UK how to get electronic mail

IF the UK government wanted to stimulate a productive electronics industry, it should take British Telecom and the relevant private companies and knock their heads together until an integrated and economic electronic mail system emerged.

So said Intel president Andrew Grove last week when he commented on his firm's future. He expected Intel to keep up the 20 to 25% a year pre-tax profit it had enjoyed since 1975.

Turnover rose 65% from $400 million in 1978 to $663 million last year and was on course for reaching $820 million this year. Research and development spending ran at a steady 10 to 15% of turnover and the size of production premises had quadrupled in the last four years, reflecting not just greater volume but process complexity increasing to match device complexity.

Current designs incorporated around 100,000 transistors per chip and the upward trend would not level off before the one million mark.

This contradicts the earlier comment from Grove's co-director, Intel chairman Gordon Moore, that increasing the complexity of devices would reduce the number of application areas for them (CW, January 31).

But Grove said future systems would have yet wider applications because Intel's architecture would reduce the cost of applying the system to the user's problem.

Intel's product philosophy for the Eighties would be based on integrating further parts of computer system architecture into the same device — up to operating systems and high level languages.

A product designed on these lines would become available within a year. One such product was called the IAPX432.

Intel was not considering using gallium arsenide or Josephson junctions, Grove said, just silicon and a few garnets (for bubble memories).


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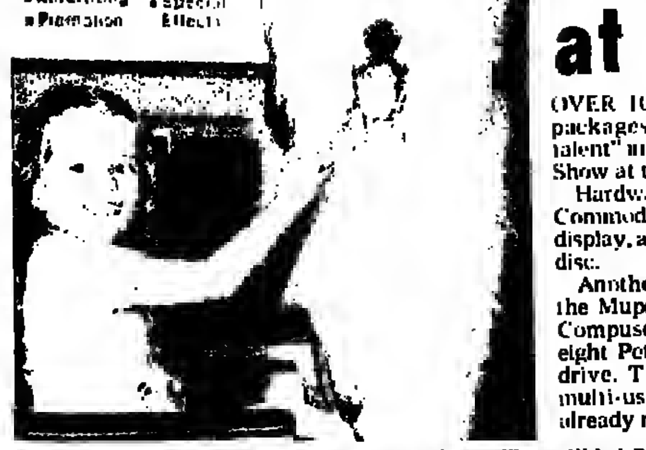

Organising the Pet Show held hidden hazards for Ilhone Uhlot Business Image. She was inundated with calls from ladies eager to enter their puppies in the show, presumably thinking that peripherals involved leads of the leather variety. One concession to disappointed pet lovers the show featured a famous Old English Sheepdog which helped four-year-old Antonia Salmon to open the show.

# Dogs banned at Pet show!

OVER 100 systems, each showing a variety of packages, demonstrated the wealth of "micro-talent" among UK Pet users at the world's first Pet Show at the Cafe Royal, London, last week.

Hardware launched included the 8032 Superpet, Commodore's new machine with an 80 column display, and the 8050 1 megabyte dual drive floppy disc.

Another hardware breakthrough on show was the Mupet multi-user system developed by BMB Compuscience of Ontario, which allows up to eight Pets of any generation to run off one disc drive. There is a potentially huge market for multi-user Pets and the Canadian company is already negotiating with UK dealers eager to sell Mupet here.

Software on display included Commodore's new Pascal from UK firm Trans Am, games written by primary school children, medical assessment programs written by doctors, and a variety of business tools and ready-made systems, many of which originated from home users out to solve their own problems.

Encouraged by the success of the Pet in Europe, Commodore International is buying a factory from AEG Telefunken at Brunsweig, near Frankfurt, to spearhead Pet production in Europe.

In the UK alone, sales of the Pet have exceeded 20,000.

## Video disc player links forged

SANYO has joined Japanese companies Sharp, Sony and Trio Kenwood in acquiring a licence from Philips to make and sell the video disc player developed jointly by Philips and MCA. Philips is test marketing the player and expects to sell it nationwide in the US by the end of the year at $775.

RCA plans to enter the market early next year.

### Coldata deal

COLDATA of Reading has signed an agreement worth $250,000 a year with the Data Printer Corp of Malden, Massachusetts.


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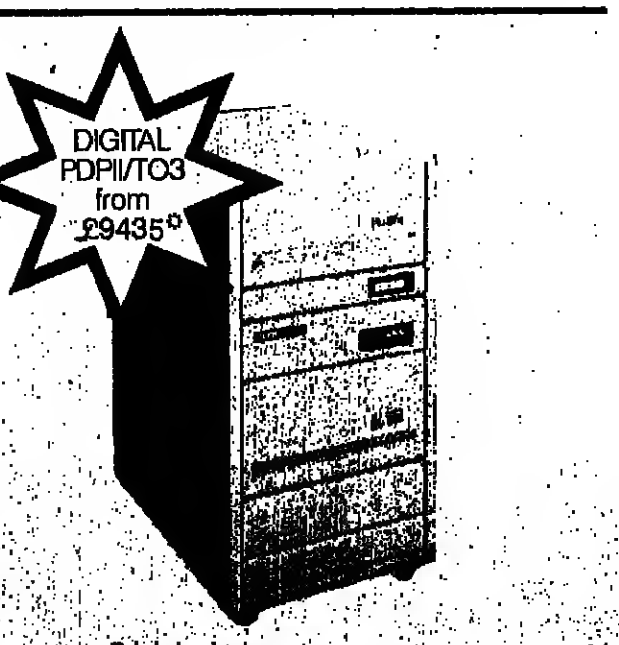


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# Downtime

by Chad

## Is this the final program?

THE string of stories about the end of the world being narrowly avoided after "computer errors" is becoming positively boring. The only surprising thing is that the EOTW has not happened already, given the utter incompetence of the US Department of Defence demonstrated in the cock-up over the Iranian hostages rescue. What you don't realise is that the Doomsday stories are all part of a cunning plot originating from Moscow.

These scheming subversives are always careful to remember the lessons they learnt at their mothers' knees, unlike us supposedly more sophisticated Westerners.

Can you recall the story of the boy who cried "Wolf"? The Kremlinites can, and it has inspired them, I can now reveal, to plant a highly trained cadre of fifth-columnists among the eighty-columnist programmers of the US Air Force. These have been instructed to rig the NORAD system so that it gives false alarms at regular intervals. Then when the Russians launch their real attack and the system cries "Havoc!" no one will believe it.

That way the US defence will be obliterated and in no time the Red Army will be swigging back Coke, sitting around Hollywood and Vine in their souvenir Afghan coats. Clever eh?

Of course, here in Britain we needn't worry. As soon as the invaders heave into sight with their atomic cannons, we'll set the Royal Horse Artillery on to them.

"Try to think of me as a word processor."

## Sending Buzby down the river

I SEEM to spend a lot of time laying into the Post Office, so it is only right I should give the people there due credit when they achieve something really remarkable. It certainly seemed to me they had done that the other day when I was lolling by the side of Denham Lock in Middlesex. Along came a narrow-boat and through one of the windows I could see a real live telephone.

It was a well-mounted model, and I could even read the number: Rickmansworth something-or-other. What wonders will modern technology come up with next, I thought!

I started trying to work out what mechanism the boat would need to pay out an enormously long wire all along the bottom of the Grand Union Canal as it processed gracefully on its way. But the expense! It sounds like the man who invented a marvellous money-saving electric car and then had to pay £50,000 for the flex.

Then think what would happen to the wire when the lock gates closed on it. Heartfelt phone calls cut off in their prime? No, I gather there is a little socket at the boat's normal mooring into which they plug when they are there.

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## GILB'S MYTHODOLOGY

# Who's being trained to be an Infotect?

Tom Gilb is an independent consultant, lecturer and author on computing topics.

ACCORDING to a recent report in the Computer press, the word "infotecture" was invented by a Frenchman to describe activity close to what is today called in English "software engineering."

The term infotecture is very attractive. It translates directly into most European languages (infotektur or infotecture). It is short. It is not weighted down with the word "software". Software is too often taken to mean only programs such as operating systems, database management systems, compilers and the like. It does not in the minds of many professionals clearly apply to applications programs, databases or files, data design of for example input, documentation, and it certainly does not apply to the selection and configuration of hardware or the organisational problems such as training, ease of learning, motivation, and responsibility for results, all of which are interesting subjects in the context of the architecture of an information processing system development.

Infotecture is in other words a higher level term. It can make use of software engineering, but it encompasses much more.

I believe that it would be a healthy step if we asked ourselves as a profession: do we need an infotecture discipline? Is anybody getting the necessary professional training to be an infotect?

The term architect comes from the Greek words Archi ("chief") and tekton ("worker"). "Info" has roots in the Latin "informatio" which means "a representation, an outline, a sketch" and is itself derived from "informare": to give form, to represent, to inform.

Infotecture has reasonable roots, although the immediate intention is to make use of the general public's awareness of the association of the word info with data processing and the wider art of information processing systems. In addition the "tecture" part has a clear immediate association with the high level engineering discipline of architecture.

I have exposed readers of this column to a set of techniques which I have collectively called "Design by Objectives". I would certainly include DBO methods as candidates for tools in practical infotecture, without making any claims that they are best or complete.

Certainly the international interest I have noticed in the Design by Objectives methods seems to result from recognition of the need for a higher level architecture method than the algorithmic and functional methods currently practised.

But I would hope that the budding infotects would spend much of their time studying examples of good and bad infotecture. At least we have plenty of the latter category available for study: perhaps we do have so many unhappy systems because of a lack of consciousness on the part of the system builders. They seem to think that any experienced Cobol carpenter is qualified to serve as chief infotect.

One of the world's largest software producing sites (about 1,800 "professionals" at one site) has recently shown warm interest in my Design by Objectives ideas. I experienced an interesting insight when they explained to me why. Their present high level system architecture methods are still highly variably practised and totally dependent on individual style. There seems to be no common language at this level, as the stringently interpretable programming languages offer at a lower level of design.

This lack of consistent and teachable method at the higher levels of systems architecture leads to a problem in systematically discovering design errors. Early design flaw identification has been proved to be of substantial practical and economic importance. Design architecture review mechanisms do exist at this site, but they are considered comparatively ineffective when matched against the effective quality inspection techniques now applied at the lower levels (module design and down) of systems architecture. Their dream is to develop an infotecture so systematically structured as to allow a much more effective quality inspection at the higher levels.

Infotecture is not an art. It is a high level engineering discipline. I think we know enough to get on with the job, if we really want to, and refine the discipline of infotecture in the coming decades.

The question is — are we motivated?

Here we are screaming at the top of our lungs for more carpenters, yet I believe that one of the chief reasons for the disturbing manpower demand is precisely a lack of infotecture.

An infotect would "design around" the lack of professionals, by both reducing and eliminating the work content of the design.

This is not a theory. I have practised it dramatically for many years. Carpenters can only work in wood — and if we let them fill the infotect shoes by default, then they will continue to specify the continued new construction of more wooden shacks.

The mythodology says there is a professional shortage. I say there is an organisational problem: we are using the wrong class of professionals to determine the infotecture.

## FOCUS

# The MIS manager has few friends outside the DP dept

WHILE shortages and lack of general resources may well be hampering DP installation teams, no such inhibitions appear to face the intrepid band of industry researchers and survey compilers. Give such individuals a problem area and they will unhesitatingly launch a survey project.

Such could well have been the case of a US survey reported earlier this year on MIS management. Management Information System managers are incidentally this year's nomenclature for DP management.

Very broadly the survey discovered that (a) MIS managers are unlike their peers in other parts of the organisation; and (b) MIS managers are more like their employees than their peers.

The report did not state the level of resources expended in unearthing such salient facts, except to say it was part of a three-year research project on the motivation of computer personnel, and involved a nationwide survey.

As so often happens, Focus could have saved the study compilers much time and trouble. During the course of a single shift it could be demonstrated that the relationship between DPM — or rather the MIS manager — and his management colleagues outside the DP section is distinctly edgy.

It does not require in-depth motivational research to discover that the DPM is normally on the defensive and that his relationship with user management for instance, while not exactly grovelling, includes a high element of humility.

Yes. The DPM does appreciate the problems facing the stores/warehousing operation, but instituting new online inventory control programs will take considerably longer than six weeks. Six months might be a more realistic timescale and even then bugs could be as prevalent as the parts bins.

The DP team are currently doing their best to absorb a 500% turnover increase in producing "reminder" sales invoices. Such requirements had not been envisaged at the specification stage and are causing severe processing problems.

No. The DP team cannot spare any resources to help sort out the tangle the distribution section has created. It was their idea to declare independence and acquire their own micro system. They should try complaining to the Office of Fair Trading, the Trades Descriptions Act or the Misrepresentation of People and Goods Act.

Hardly surprisingly the survey discovered that the MIS managers had few friends outside the DP operation, and find closer rapport with their own colleagues. Researchers seldom discover that the DP operation depends very much on team work. The operator has to acknowledge that the programmer must have access to the processor and that this access cannot always wait until the main day's tasks have been completed. Similarly the programming team should not expect the busy ops section to sort out local problem errors as and when they happen. If the run aborts after five or fewer minutes, it is a case for total reject. If, however, it aborts after two hours then remedial action could be taken — providing the programmer concerned is on hand or that the operation team itself has sufficient skills to investigate.

The system team, although by preference independent of all other groups both inside and outside the DP section, sooner or later has to accept the basic fact of installation life and liaise with the operations, programming, input and control sections. From time to time they have even been known to discuss projects with their DPM.

Maybe it is time for a survey on surveys. Often the motivations for such enterprises are those of academic achievement, publicity/promotion and (more rarely) genuine industry research. Of the collection, that of academic research is a well defined growth area. Put any two Hatfield Poly academics together and the chances are they will initiate an in-depth survey on such a topic as "the number of key strokes involved in word processing as compared to a squash match."

## TEN YEARS AGO.....

● From Computer Weekly of June 18, 1970.

IN September the British Aircraft Corp will become the second organisation in the country to take delivery of an ICL 1906A, the most powerful British computer . . . Arthur Humphreys, managing director of ICL, is appointed a CBE in the Birthday Honours . . . The first IBM System 3 to be delivered in the UK has been installed at Dominion House, the London offices of Charles Fulton and Co. . . . Tonight BBC Radio will provide a General Election results prediction service based on an IBM 360/40. . . John Hunt, MP for Bromley since 1964, has been appointed president of the Institute of Data Processing . . . EMI has taken over Recording Designs Ltd of Camberley, Surrey, the principal British company specialising in magnetic tape data storage equipment . . . A new service bureau which will operate as a subsidiary of fuel distributor Charrington, Gardner and Locket, Charringtons Computer Services, is to start operations next month.



# Altergo moves into micrographics

ALTERGO has set up a new company, Altergo Services, to market and support computer-based micrographics systems. The main product to be promoted will be the Automated Records Management Systems, Arms, which enables images of documents to be accessed and transmitted from a central store to many different and widely dispersed user locations in a few seconds.

Arms is built in the US by Teknekron Controls of Berkeley, California, an autonomous division of Teknekron Inc, a high technology consultancy with more than 400 staff active in many areas of science and engineering.

Teknekron's greatest strength is in the area of sensing systems where it has supplied special equipment to customers, ranging from tyre manufacturers to the US Federal Reserve Bank which uses Teknekron kit to detect the denomination of old bank notes before they are destroyed.

Arms systems in various custom built forms have so far been supplied to six different customers in the US, and Altergo Services is to market them in partnership with Teknekron in the UK and also in Kuwait where Altergo already has a subsidiary company.

Teknekron says Altergo was chosen primarily because of its strength in developing software. An Arms system can be configured around a dedicated standalone minicomputer, like the Data General Eclipse C/150, or controlled by a partition on a customer's existing mainframe.

In its present form Arms stores documents in microfiche form either in a modified version of one of the carousel-based automated retrieval units built by Image Systems, or in a much bigger unit developed by Teknekron itself and called the Storage, Retrieval and Scanning Module, SRSM.

After a fiche holding the required frame has been retrieved under software control the frame is scanned by a camera employing a charge coupled device array and the picture is then digitised to generate an image with a resolution of three million bits per frame or 180 lines per minute.

A vital feature of Arms is that digitised images can be held on a magnetic disc which acts as a buffer between the relatively slow mechanical microfiche retrieval unit and the electronic side of the system. Also of importance is that digitised images can be improved and enhanced by software. Greatly reduced images of very large drawings, for example, can be enhanced so that they are clearer than the original.

The user end of Arms consists of high resolution display terminals built by Teknekron itself that can also double as conventional computer terminals. If the host computer is an IBM machine, for example, the Teknekron terminals can emulate the IBM 3277.

● Arms is not entirely unique. Six years ago Stableiron of Fareham, Hants, introduced a multi-access image distribution system (CW, March 14, 1974) called Datavision. Only one system is installed in the UK the user being Scotland Yard, although sales have also been made to police forces in West Germany. The system has now been taken over by Antone Systems of Bournemouth which is bringing out a new version with image digitising and manipulation features said to be similar to those offered by Arms. In its present form the Antone system distributes analogue images over coaxial cables which offers far less flexibility than handling digitised images.

## Database directors set up consultancy

DIRECTORS of the UK's two top suppliers of scientific databases, Derek Barlow of Inspec and Tony Kent of UKCIS, are resigning to set up a consultancy on online information retrieval. They aim particularly to provide advice to the European Commission and to US database suppliers.

Inspec deals with physics, electronics and computers, while UKCIS provides chemical information.

## Share in US manufacturer

THE UK firm, Computer Services Centre (Holdings) has taken a 30% share in the US data entry terminal manufacturer, International Entry Systems of Seattle, which builds the Datacorder portable terminal.

CSC's subsidiary, Microcosmic Systems of Acton, London, sells Datacorder exclusively in the UK.

## Services group profits up 157%

APPLIED Computer Techniques, the Birmingham-based computer services group, has announced substantially increased turnover and profit figures for its financial year ended March 31. Net profits increased 157% to £502,798 and turnover rose 79% to £5,568,285.

ACT is raising about £800,000 for further expansion by a rights issue of 302,500 new ordinary shares.

## Cap Gemini Sogeti well ahead

LAST year's turnover of Cap Gemini Sogeti, the world's largest software house outside the US, was $113,230,000, up 19% over 1978. Profits before tax were $12,889,000.

During the year British Airways' subsidiary IAL took a 10% stake in CGS with the setting up of the UK joint venture, IAL Gemini.

## AES Wordplex announce marketing split

AES Wordplex is splitting the marketing of its two word processing product lines, 18 months after the merger which brought the two Canadian-based companies together. This is to enable salesmen to specialise and simplify their training and support, while keeping the company's financial, marketing and engineering services together.

It was felt at the time of the merger that the AES and Wordplex product lines were compatible, but according to marketing director Mike Arnold both lines have been developing their separate identities. "They do not wholly overlap but there will be areas where they compete," he says.

AES Wordplex's turnover for 1979, just announced, was £9.1 million, up from £3.5 million in 1978, giving a profit of £571,000.

Another UK word processing supplier, Nexos, has formed a subsidiary in Germany to sell its products there, expecting to have 50 staff within a year.

## Logica-Tandem £1m OEM deal

TANDEM, makers of NonStop minicomputers sold only in multiprocessor configurations, and systems house Logica have signed a £1 million OEM deal.

Winner of General Automation's essay competition on "Energy — where do we go from here?" was Janet Harris of Onslow School, Hatfield. Her school receives the first prize of a GA mini with two VDUs, printer, and discs, in all worth £30,000. Our picture shows Janet with the judges, among whom were Professor Eric Laithwaite (left) and Dr Magnus Pyke (right). There were 1,600 entries.

## Micros in schools working group

A WORKING group on microcomputers in schools has been set up by the Social Science Research Council, to consider what role the Council should take in determining the course taken by computer education. Anyone with suggestions on the subject is asked to submit them to the group, which is aiming to complete its report by the autumn.

The SSRC could fund research into the use of micros in schools; this would be on a long-term basis while the Department of Education and Science and other bodies dealt with more immediate issues. The sort of questions to be asked include: How should the curriculum be developed; how should hardware be introduced and what options are there for this; what software is needed and how can it be produced; how should teachers be trained; what support services do schools require.

Submissions should be sent as soon as possible to Glyn Davies at the SSRC, 1 Temple Avenue, London EC4Y 0RD.


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**PAGE SIX** for programmers and analysts

# These disabled trainees are as good as any

"DON'T look at what we can't do," said Geoff Busby speaking of the disabled in computing (Page Six, January 31). "Look at what we *can* do." With the first TOPS course in computer programming just finishing at Queen Elizabeth's Training College, this seemed the perfect opportunity to take up Geoff Busby's challenge.

The Queen Elizabeth's foundation for the disabled is a residential college at Leatherhead, Surrey, for disabled people and provides training in many subjects leading to normal employment. The computer programming course is a recent addition to the college's syllabus and is financed by the TOPS scheme and operated by ICL.

Seven students have taken part in the scheme, and there is already a long waiting list for future courses. To qualify for the course applicants have to pass aptitude tests and an interview, and must be sufficiently disabled to be unable to participate in any conventional training courses.

"Severely disabled" is a difficult term to define, but in this case it means that most students will be immobile and usually in wheelchairs. The course is the standard ICL TOPS programming course, but lasts two weeks longer, mainly because a great deal of time is taken up with travelling problems. As most of the students live some distance from the college, bank holidays have to be extended to cope with the difficulties of getting from home to college.

The course comes under the college's Business Studies Department and students receive some business studies training from Queen Elizabeth's own staff. The programming training is done by ICL lecturers.

Eight students took part in the scheme, and varied in age and experience. They included a Vietnamese "Boat Person", an ex-managing director and a spastic who had already written two books and obtained an Open University degree before starting the TOPS course.

There was also a wide variety of work experience and disability within the group. Some had worked for many years; others had never had the opportunity to work before.

The problem of gaining work experience is a vicious circle for any school or college leaver. A disabled person looking for a job finds the obstacles even greater. Few employers are prepared to take the risk of recruiting

Lam Phat Luc and John Draper, two of the eight students who have overcome their disability to succeed in the course.

someone who is not only inexperienced but also physically incapacitated. Will they be able to cope with a full-time job? What about transport? Will any special aids be necessary?

The aim of the courses at Queen Elizabeth College is to equip disabled people with the ability and confidence to occupy a normal job in society. The computer programming course provides intensive training in Cobol, and after the 12 weeks the students have written and run a suite of five programs.

The success of the course has been proved by the fact that students completed it and are now as proficient in programming as anyone who has gone through the TOPS scheme.

TOPS courses throughout the country boast a placement figure of about 90%; consequently it is alarming that, to date, not one of the graduates of the disabled course has been able to find employment.

The college goes to great lengths to find work for its students. The staff try to keep in constant touch with employers. The BCS specialist group for the disabled has also recently compiled a list of interested employers and companies which it is holding on computer.

Students have been given instruction in applying for jobs and every step has been taken to find suitable work for them. Unfortunately it is now proving difficult to get employers to commit themselves to taking on disabled staff.

However, those who have completed the course have fought all the odds against them. The programming course means working in the evenings and at weekends and spending 12 weeks away from their families. Few of the successful students had any previous computer experience.

Lam Phat Luc came to this country from Vietnam where he had lost his right leg in the Vietnam War. It seems callous to say that compared to some people he is not really disabled; but the college has a policy of usually accepting only students who are unable to move.

He is now living in Belfast with his younger brothers and sisters. Lam Phat Luc's success is a double accomplishment: not only has he mastered a strange language and a completely new life-style but he has also learnt to write programs in Cobol. "It has been difficult," he agreed. "If there is a term or word I do not understand the others have to try and explain it as simply as possible." Obviously there are not many Vietnamese dictionaries which contain comprehensive definitions of computer terminology.

The seven students range in age from 21 to 55. The eldest in the group is John Draper. His particular story shows that disability is not always something that people suffer from birth, and it can in fact happen to anyone. John was enjoying a successful career as a managing director when he was stricken by kidney failure. Because he had to have regular treatment from a kidney machine, he thought that his career was at an end.

"I decided to take this course in computer programming not only because I wanted to pursue a second career but also because I felt computing was an up-and-coming growth industry," he said. "And programming is a job I can do despite my handicap."

Although without previous experience, he has a good idea of the industry and knows a great deal about the administration side of computer applications. For him, a career in computing is a complete departure and a fresh start.

For many disabled people the course provides the opportunity to start work for the first time in their lives.

ICL lecturer Sally Kemp checks a listing with Simon Watson.

Robert Hargreaves is 22 and suffers from muscular dystrophy. He has never had a job and before taking the TOPS course he was unemployed. Before that he was at technical college studying for A-levels. During the 18 months he was unemployed, Robert had only one interview.

Failure is something which the disabled take for granted. When we visited the students at Queen Elizabeth's College they still had several weeks of the course to complete. Most of them were pessimistic about their chances of getting a job.

"The course has been very good and very useful," said Robert Trent, also confined to a wheelchair. "But it's going to be dodgy getting a job. People just aren't willing to take the risk."

Simon Watson had actually done clerical work before going on the TOPS course. "We just have to try that bit harder," he said. "Being immobile doesn't help."

Some students have been luckier than others. Glynn Vernon, for example, had already completed an Open University degree course and written two books before deciding to study computer programming. Glynn is a spastic and overcomes his difficulty with speech by using a Lightwriter machine. He types whatever he wants to say on the keyboard. The machine has an outward-facing marching display so whoever is speaking to him can understand.

In spite of Glynn's obvious determination and accomplishments, even he has been unlucky in his search for a programming position.

The ICL lecturer in charge of the course, Sally Kemp, spoke about the students and their chances of finding employment.

"They are all very keen and have all done really well," she said. "Their performance has been no different from that of normal students."

"If the course has been at all slower than the conventional TOPS course, it has been because of mere practicalities," she explained. "Physical things like sorting card decks obviously take longer. A few extra days are lost with bank holidays, too."

What about their chances of finding a job? "There are plenty of vacancies for programmers these days," said Sally Kemp. "So if these students can't get a job in computing they really won't get one anywhere. Hopefully some employers will offer them a chance.

## Trend towards making programming easier

FOLLOWING the trend towards easier-to-use software, Univac has introduced a new Dialog processor with its System 80 small computer, which raises some interesting questions about the DP department's attitude towards the end user.

The System 80 is the successor to Univac's 90/25, 90/30 and 90/40 machines, and a key feature of the Dialog processor is that it enables users to add new interfaces to their existing 90-series programs.

For example, it is possible to take an existing data entry program and add a question-and-answer session as a sort of "front-end" to guide the operator through the program, simplifying the data and parameter inputs.

The question this raises is whether DP departments will think it worth taking those tried and tested programs and actually adding facilities to make them easier to use. An argument for it would clearly be that as it becomes harder to get skilled clerical staff, it is necessary to make computer systems ever easier to use.

But at the same time the approach will tend to de-skill the jobs of the existing personnel — and although the facility is put over as enabling users of the system to become more productive, this could well be at the expense of making the job more boring.

If people become quickly bored with their jobs they become less productive, one assumes.

Other features of Dialog which are of interest to the programmer include the facility to invoke the Dialog processor to handle much of the interaction between the user and the system, thus reducing the amount of Cobol which has to be written in a new application.

There is also a screen format generator which enables programmers, and perhaps end-users as well, to set up their own screen formats and set their own validation rules. And once these screen formats are stored, they become available to any other application, regardless of the programming language in which it is written.

The features are similar to those on the ICL ME29 (Page Six, April 3), and underline a steady trend towards making programming easier and programmers more productive. Clearly there are benefits, but are the blessings wholly unmixed from the point of view of the programmer? Page Six would like to hear your views.

### Puzzler

1,893,732,828,398,318
7,538,062,944,751,882
3,458,517,136,208,224
4,751,006,884,295,101
5,901,843,220,188,100
2,812,359,789,576,516
1,000,000,000,000,001
6,179,289,533,122,438
1,357,913,579,135,791
1,467,898,798,321,528

Only one of these 10 numbers is a square. Can you find it without actually doing any square-root sums? See page 61 for solution.


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**SOFTWARE FILE** by Claire Gooding

# Moves to cut Cobol maintenance costs

SOLVFIELD, a small company in Haslemere, Surrey, which specialises in the theory and practice of language transformation, has turned its attention to Cobol maintenance.

Solvfield's director, John Cole, quotes disturbing figures for the amount of time and effort devoted to maintenance, including the conclusion of a Defence Department survey in the US that "If a large Cobol system of 'N' lines is written, the number of source lines that are changed each year is 'N'."

According to Cole, a typical Cobol installation allocates about 80% of programmers' time to maintenance each year. "Only 4% to 5% of maintenance effort is spent on the actual coding", he explained.

"Most of the time is devoted to understanding the style in which the program has been written, and searching for answers to questions about the program itself."

Cole puts a figure of 32% on the time spent sorting out quirks of individual style, which can vary within a program written by a particular programmer as well as with layers of subsequent maintenance.

He believes that the search for accurate information about the program and its environment takes 27% of effort, and the generation of test data, documentation and actual testing accounts for 31%.

Solvfield's new family of products, called Panache, are designed to deal with these complex factors by enforcing programming standards and documentation. First to be released are A-Panache for IBM Assembler, and C-Panache for Ansi Cobol, which, according to Cole, can save over 40% of the time spent in Cobol maintenance.

The standard style to be enforced can be tailored to the in-house standards of a particular installation and altered if necessary. C-Panache also generates a set of tables which analyse REDEFINES, OCCURS and NAMES, give a file map of each field, outline the logic flow and the role of each paragraph, and finally provide a breakdown of the testing, setting and using of values.

Solvfield's philosophy is to attack the problem from the top rather than adapting a specific tool to a general purpose. Panache is part of a much wider approach to the practicalities of computing which draws on academic, almost philosophical disciplines.

The company has won a respectable clientele for its Protran technique of translation and conversion, which copes with data files, programs, and other transformations via a metalanguage, Metal.

Panache comes of the same philosophy, attacking the standards problem at the root rather than piecemeal, but is likely to find itself competing with other documentation aids of different scope such as Byblos, and ADR's Autoflow.

A-Panache costs from £650 upwards, and C-Panache from £1,950 upwards, although prices depend on individual needs. Solvfield can be contacted through Cole at Haslemere (0424) 4444.

## Pansophic devolves marketing

**THE US software firm Pansophic, which markets its products Easytrieve and Panvalet worldwide, is introducing "devolution" of its European operations and setting up new headquarters in Western Avenue, London.**

**The move reflects a general trend among companies with international interests to hand over selling to "home grown" staff. Pansophic's reorganisation is reflected both in the decentralisation at a local level, allowing more autonomy to European subsidiaries, and in the central management, which has become multinational.**

**London was chosen for the new European base to avoid language problems, and because it provides attractive facilities, as well as cheaper support staff than in The Hague, where the company previously managed European sales.**

**The company has initiated a recruiting drive, and completed its first sales training course.**

## Automatic back-up in FDR option

AN OPTION to Westinghouse Management Systems' widely used Fast Dump Restore, FDR, that will allow users to automate back-up procedures based on the last reference data of a dataset, is expected at the end of the year.

Called ABR, the option also simplifies housekeeping, freeing disc space by making an automatic back-up, scratching and uncataloguing datasets that have not been referenced in a specified number of days.

It also restores them from the archives as necessary, and reports on the status of datasets on back-up or archive tapes.

The company recently made an agreement with Gulf International Consultancy Centre to sell Westinghouse software products in the Middle East, including FDR and its data compression utility Compaktor.

Westinghouse says FDR already covers 90% of the UK market for IBM and compatible mainframes running under OS operating system including MVS, SVS, VS1 and VS2.

Like FDR and Compaktor, ABR is a product of Innovation Data Processing in the US. Westinghouse will be pursuing the policy of undercutting competitors, selling the product for about £4,000 to those already using FDR.

### For IBM users

AMDAHL software, previously provided only to sites using the Amdahl 470, is to be made available to users of IBM 370/303X hardware. The first product to be offered is VM/Performance Enhancement which is designed to reduce system overhead for IBM Multiple Virtual Storage and Single Virtual Storage operating systems, when either runs concurrently with IBM VM/370.

## DEC speeds up CTS-300 operating system

A MORE powerful version of the CTS-300 operating system for the Digital Equipment Datasystems family of small business machines has been announced. DEC claims that Version 6 executes utilities at speeds up to 15 times faster than the previous version and enables program development and debugging to take place at the same time as applications activities.

DEC has also enhanced the DECsystem-20 operating system, offering 23 new facilities in Release 4, including support of PDP-11 based Remote Job Entry and features to increase productivity.

Improvements in throughput up to 50% are also claimed for the DECsystem-10 mainframe configurations using the new symmetric multiprocessing capability, SMP.

Designed for use with dual DECsystem-10s using KL10 processor, SMP enables both processors to perform computation and input/output functions and is aimed mostly at service bureaux, large database laboratories and in-house time sharing installations.

### Replacement for UCC Fifteen

THE University Computing Company has released a replacement for its UCC Fifteen operating system software, called UCC Eleven. It is an automated job re-run and tracking system which supplies data on re-runs under OS Console, TSO, CICS, Roscoe and Jes 3.

## Logica in joint Finnish venture

LOGICA is to collaborate with Cybernetica Oy of Helsinki on computer systems implementation and consultancy in Finland.

Cybernetics Oy is the offspring of a well-established family freight company and, with a staff of 40, is one of Finland's largest independent computer systems firms. Like Logica, it has been operating in Finland for five years, and for the last two years the two companies have shared several projects.

In recent years the market for computer skills in Finland has widened considerably, and Logica claims that the new operation will bring its specialist skills to an area where they are not otherwise represented.

### First users

THREE ICI locations in the UK are to use the Plant Design Management System from Compeda, the design software specialists, to help design process plants.

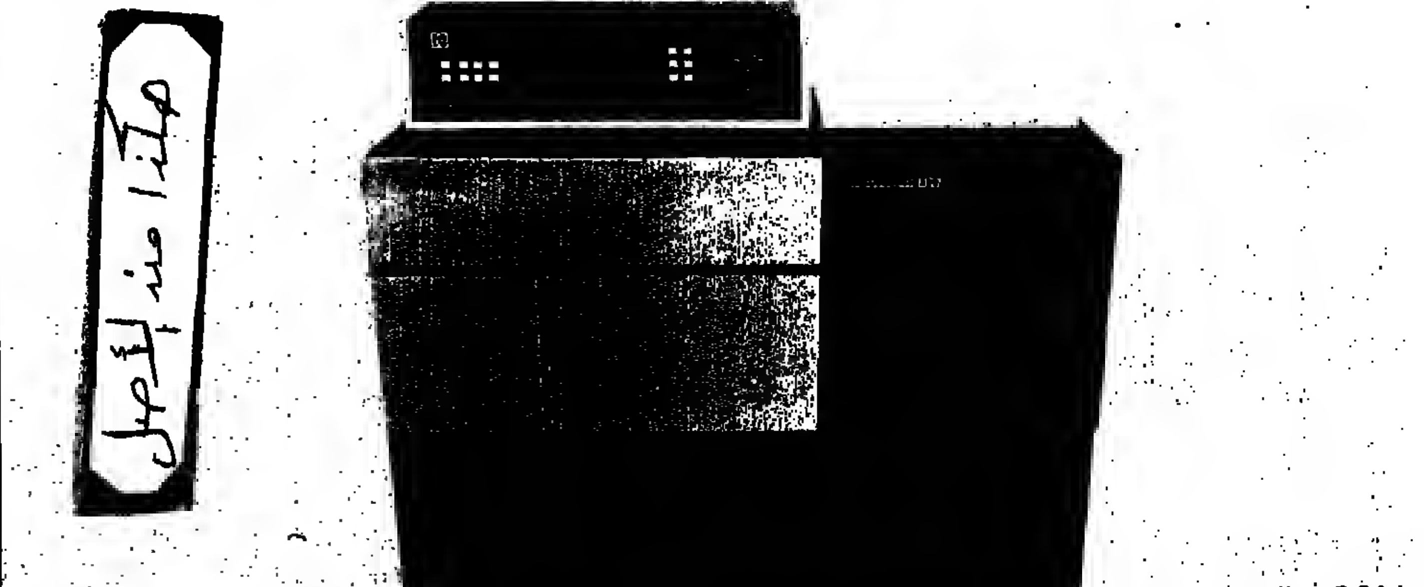
## Pascal for computer students

**A JOINT software development project by Hull University and Harris Computer Systems has given rise to a new Pascal compiler specifically designed for university and polytechnic computer students.**

**Supported under the Vulcan operating system, the compiler will be available later this year for use with the Harris 100, 500 and 800 series of digital minicomputers.**

**While implementing the full Pascal language as defined in the proposed UK standard, the compiler will allow the user to specify non-Pascal procedures and access existing libraries such as Nag and Gino. Other features, such as optional checks and debugging aids are available, which Harris believes will make the language suitable for large commercial and scientific users.**


**From Kodak a laser printer.**



A laser printer with a print-out speed equal to the best available today but at a third of the capital cost has got to be good news.

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CW6

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## OP SPOT

by Bernard Allen

# Major pitfalls for the ops manager

DEVELOPMENTS in technology are likely to cause the poor old operations manager a lot of headaches over the next few years.

To avoid serious problems he must use fine judgment and discretion when dealing with staff, unions and upper management.

But that's not all — he must be careful when selecting from the wide range of hardware and software which is becoming increasingly available.

Some of the major pitfalls and the ways and means of dealing with them were outlined at Infotech Operations' conference on the Automated Operator the other week.

Presenting a paper on the implications and dangers of automation, Terry Molloy, assistant secretary of the Banking, Insurance and Finance Union, told the delegates: "The operations department is the first department to feel the implications of automated and online banking."

Molloy referred specifically to the Gloucester and Wythenshawe computer centres of Barclays Bank, where seven-day, 24-hour cover is provided and the operations staff has been reduced by one third over the past five years.

Molloy emphasised the need for negotiation between employers and unions. He said, "We recognise the need for new technology and further automation, but employers have to recognise the need for negotiation and consultation."

Less communication between the operations manager and upper management was advocated by Herb Grosch, an independent consultant from the US.

Grosch told the managers, "Number One of your list of priorities is not to produce too much information for upper management. Top management should come down every three months or so, just to see the sort of problems you face."

He told delegates that hardware would get "cleverer and cleverer," with a great increase in processor speed and a considerable reduction in the cost of memory.

Rather less optimistic about software developments, Grosch warned the delegates: "Be careful — there's no point in implementing the innovations of software houses which are likely to disappear overnight. You've got to consider maintenance."

More bad news, as Grosch went on: "Networks will be a bloody battlefield, calling for much very expensive custom-built software."

An interesting view on the level of automation likely to take place in the operations department was presented by Bill MacDonald of Span Software.

He predicted that all manual tasks would disappear and that the operations department would become fully automated.

"To describe our operations department of the future in one sentence, it would be fair to say: 'Operator intervention is a thing of the past.' "

He went on, "The ideal solution to the problem of job set-up and re-start is to take the decision-making process out of the hands of those responsible for reviving the computer and give it to the appropriate development or implementation team."

# How each section should contribute to impact statement

WHEN developing an application the project team should seek the advice of users, operations, data control and other sections which will use and be affected by it.

The impact statement — a series of documents, including checklists and project checkpoints — is one way of doing this.

That is the essence of a previous Op Spot piece based on a portfolio from Auerbach and entitled the Data Centre Impact Statement: General Procedures.

Further details of how each part of the centre should contribute to the impact statement are given in a follow-up to that portfolio. It's called the Data Centre Impact Statement: Section Responsibilities, and is one of the latest updates to Data Centre Operations Management.*

According to the report, the data entry supervisor should work with the project leader in the design of input documents and the records to be keyed in by data entry staff.

"The supervisor should ensure that the documents are straightforward and as easy to key from as possible. Once the design of the forms is agreed upon, the data entry supervisor should carefully monitor any attempts to change the design."

Regarding input records, it goes on: "The supervisor can provide valuable assistance in this area, especially in data centres with new, sophisticated data entry equipment. It is not unusual even today to find input records being designed on the basis of 80-column punched cards. Unless the data centre uses punched cards for input, there is no reason except habit or ignorance to continue to use this format."

Further benefits may be obtained by seeking the advice of the data entry supervisor: "This involvement gives the supervisor a clearer understanding of the system, allowing him or her to develop better estimates of the total keying time needed to complete the input cycles of the system."

The data control section should use the impact statement as a means of putting tight record controls on the new system:

"Basic controls vary from project to project; however, there are basic record controls that must be included in every system. Basic record counts must be recorded; prior record totals from the output of the last run, added to the total of transactions successfully processed during the current run, must equal the total number of records on the file at the end of the run.

"Internal controls should be set up so that when an error is encountered one of two steps will be taken. If the error is not 'fatal' but could cause difficulty, a message should be printed and processing should continue. If the error condition is serious, however, processing should stop after the error message is printed."

The operations supervisor should complete his section of the impact statement as the final, or systems testing, phase of the project begins.

"The primary responsibility of the operations supervisor is to review and approve the proposed operations documentation to be used by the computer operators.

"Careful attention should be paid to the re-start and return instructions. As a part of its effort to operate as a stand-alone unit, the data centre should be able, in most cases, to put systems back into operation after equipment failures or operational errors without assistance from systems and programming.

"During system testing the operations supervisor should invite the operators to comment on the operation of the system. Worthwhile comments should be passed on to the project team. Such feedback from the data centre operations helps the project team refine the system."

The input statement is useless, unless the data centre manager recognises it as a means of ensuring that the centre turns out high-quality systems. He must use his authority to see that it is implemented and adhered to.

*Data Centre Operations Management. £120 including bi-monthly updates. Distributed in the UK by Computer Aid for Management, 155 Great Portland Street, London, W1. Tel: 01-637 9066.

# The life of a busy trainee

"SINCE joining the operations fraternity three months ago I have not learned a bit about computers but have also developed not inconsiderable muscle from humping stationery and disc packs around."

So comments a trainee operator who works at "a large and rather busy" installation in the Midlands.

Responding to an Op Spot on how the typical trainee spends his time and some of the ways in which he might sharpen his technical skills, he goes on: "As you rightly pointed out, we trainees do spend a considerable amount of time cleaning peripherals. At our installation, we clean the tape drives and printers at the end of the evening shift. (In fairness, the operators and senior operators sometimes give us some help.)

"However, so far, most of my time at the installation has been spent humping stationery from the store and loading it on the printers."

At our friend's installation the trainees are also responsible for mounting tapes and discs, feeding cards to the card readers, and fetching media to and from the library.

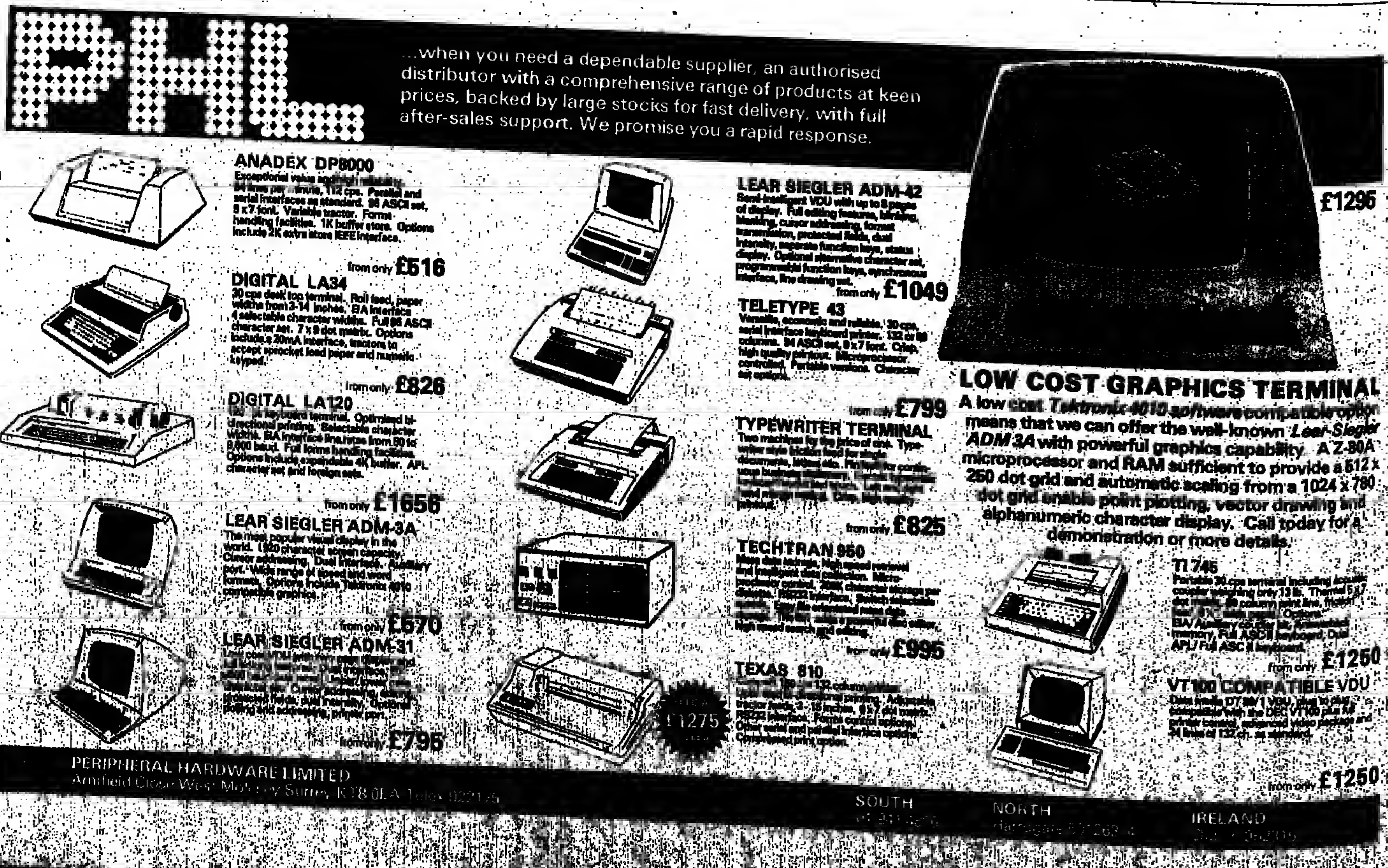
Their duties also include making carriage control loops, and helping with the bursting and decollating of output.

Despite being kept so busy, the operators are able to make use of the site's training scheme. And they get help from the other operators, too.

"We're quite lucky, really. Most of the senior operators are only too willing to answer our questions about the system, and that's a great help to us."

The trainees are also encouraged to run small jobs of their own, using JCL and utilities.

"We have to get the permission of the shift leader first, though. He checks the deck to see that we don't go deleting any important files."



Dr Amdahl (left) receives the British Computer Society's Certificate of Distinguished Fellowship from past president Professor Frank Sumner. The certificate was awarded for outstanding services to computing.

Dr Amdahl was named Data Processing Management Man of the Year in 1976, and has received the IEEE W. Wallace McDowell Award, also for his outstanding service to computing. Mrs Amdahl is in the centre of the picture.

# H will bring big memory changes —Gene Amdahl

BIG changes in the memory management area, but few differences from the big 370s from the user's viewpoint. That is Dr Gene Amdahl's current belief in the nature of IBM's forthcoming H-series.

Looking fit and well after the back trouble which forced him to resign from the company he founded, Dr Amdahl is enthusiastic about the proposed merger with disc and tape drive manufacturer Storage Technology.

"I prefer the deal to the one we nearly concluded with Memorex," he told Computer Weekly. "I like the approximately 50-50 nature of the deal and I particularly like Storage Technology's attention to excellence in its products."

Dr Amdahl is still consulting with the company which bears his name, but his views cannot necessarily be taken as official company policy. On the announcement of Amdahl's answer to the H-series, he remains in line with statements made previously by company officers.

"I would like to announce our answer to the H before IBM announces," he said, adding with a smile — "but only about a month before!"

Whatever technology IBM uses in the H-series, Amdahl will be sticking with Emitter Coupled Logic for its next generation.

Amplifying his thoughts on the changes in the H, he said that the way memory and data were managed in the machine would be the key differences, and he did not expect enormous memory capacities in the next generation. "32 megabytes should see us through the next generation," he said.

"IBM has a problem: you can increase the capacities on disc enormously, but you cannot increase the access times to the same extent."

He sticks to his thesis that it is an IBM software world, but added that as a result of the efforts of companies like the one he founded, IBM's hegemony was over.

In 1987, Amdahl software might not be identical to IBM's. "But it will still be very close," he declared.

# Four-way contest won by Honeywell with twin system

"IN every case where a manufacturer proposed a single machine as an alternative to a twin system capable of handling our requirements, when shared peripherals were taken into account, the solution using a twin system worked out cheaper."

So says Trevor Bentley, management services manager at the Tilcon subsidiary of the Thomas Tilling Group.

An interesting four-way contest for Tilcon's business, where Univac was the resident supplier, ended with a win for Honeywell, with conversion costs, growth possibilities and networking capability the deciding factors.

With an outmoded overnight batch system at present, Tilcon wanted a replacement system for its Univac 9400 and 9480 which could handle interactive applications and support an integrated network of data and word processing and electronic mail.

Honeywell bid two Level 64/DPS machines, Univac 90/30s, ICL 2905s and NCR Criterion 8555s.

Surprisingly, Honeywell came out best on conversion.

"They told us that with their conversion aids programs could be converted in an average of 1½ days each, and as we have some 500 programs to convert, that was important," Bentley told Computer Weekly.

"We are currently achieving a conversion rate better than that.

"Within two weeks of our signing the contract, they installed terminals to a Level 64 at their Hammersmith centre. That was in mid-January. In February they loaned us a machine, and our first is due in June, with the second following in November."

According to Trevor Bentley, as well as producing the lowest cost solution when conversion costs were included, Honeywell's networking offering, with Level 6 minicomputers and Incoterm terminals, using the Honeywell Distributed Systems Architecture, looked the most attractive solution.

"We were able to see it working at other user sites. We have a central development unit here in Harrogate, and we want to do all the development work centrally and then distribute it to the field. Honeywell showed the greatest understanding of our needs."

It is envisaged that two or three Level 6 minis and 60 to 70 terminals will be required.

Univac and ICL were both hampered in their bids in that both were preparing to bring out new machines — Univac the System 80 and ICL the ME29 — outside Tilcon's timescales. Univac finally offered an 1100/60. Their existing networking offerings were less developed than Honeywell's.

In normal working mode, one of the two Level 64/DPS-2 machines will look after the communications network while the other handles batch work.

# Grisanti steps down at GA

COMPANY doctor Frank Grisanti, brought in by General Automation in May last year to sort out its serious financial problems (CW, September 13, 1979) has stood down as interim president and has been replaced by a permanent president and chief executive.

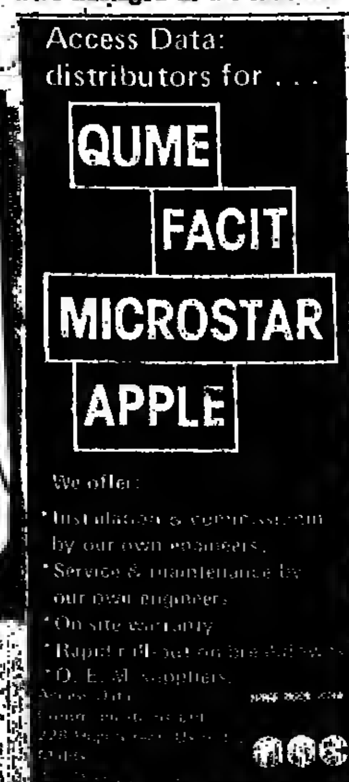
The new man is Leonard Mackenzie who was formerly president of Northern Telecom Systems Corp, the computer side of the Canadian-based telecommunications giant Northern Telecom.

The intention from the start was for Grisanti to stand down once GA was back on its feet. The current situation is that a buyer is still being sought, and interested parties include Transac of France which could take a large minority share through a capital injection (CW, March 20).

In the second quarter of its current financial year, which ends in July, General Automation made a loss of $1 million on a turnover of just over $32 million.

Grisanti's efforts to improve GA's performance included the reorganisation of the company's European operations after he had blamed Europe for GA's $341,000 pre-tax loss worldwide in the first quarter (CW, January 17).

At Northern Telecom Systems Corp, Leonard McKenzie was responsible for integrating the activities of Northern Telecom acquisitions Data 100 and Sycor with the PABX arm of the group.



# PEOPLE and EVENTS

## Trier new president of EEA

DR Peter Trier has been elected president of the Electronic Engineering Association and chairman of council for 1980/81. He succeeds John Sutherland of Marconi Radar.

Trier is a director of Philips Industries, London, the Philips parent company in the UK. He was chairman of the Electronics Research Council from 1976 to 1980, and is a member of the Defence Scientific Advisory Council and a former chairman of its Maritime Warfare Advisory Board. He also serves on several other national scientific councils and committees.

He is a former vice-president of the IEE, and a former chairman of council of Brunel University. He is vice-president of the Institute of Mathematics. He holds an honorary doctorate of technology (Brunel 1975), was elected into the Fellowship of Engineering in 1970, and appointed a CBE in 1980.

FOLLOWING the establishment of the European chapter of the International Word Processing Association in London last year, the first local branch of the association has been opened in Brighton. It aims to contribute to the progress of word processing.

Elected as chairman of the new Brighton branch is Jacqueline Hertsmith (above), word processing manager of Ewbank, the international consulting engineers.

Jacqueline Hertsmith has been responsible for the development of a sophisticated in-house word processing system since joining Ewbank in 1970.

## Silver medal for Scicon director

PROFESSOR Martin Beale has been awarded the silver medal of the Operational Research Society. It is the Society's highest award, and is presented only infrequently.

Beale is technical director of Scicon Consultancy International and Scicon Computer Services and holds a visiting professorship at Imperial College, London. He is a Fellow of the Royal Society.

The presentation was made by George Mitchell, president of the Society, at the Royal Society in London, on the occasion of the Blackett Memorial Lecture which Beale delivered. The subject was Operational research and computers — a personal view, and the lecture reviewed developments of computerised OR over the past decade, particularly in optimisation methodology.

Nigel Davies has been appointed manager of the Slough branch of Burroughs. He was previously a promotion manager at Burroughs' head office and prior to that zone manager at the company's Luton branch. Manager of Burroughs' Finchley branch is Colin Pryce, formerly promotion manager at head office.

Jim Todd has become director in charge of the P-E Consulting Group's activity in the fields of production and inventory control.

Steve Smith has become vice-president of business planning for Amdahl at its headquarters in Sunnyvale, California. Ed Thompson and Ernie Thompson, both executive officers with the company, have been designated vice-presidents.

Robert Young has become the London branch manager of Pansophic Systems. He was previously managing director of Computer Associates (UK).

John Withers has become national sales manager for the computer and machine moving division of Giltspur Bullens Transport Services. Formerly a Royal Navy officer, in recent years he has worked in sales with International Aeradio and Bryans Southern Instruments.

Evelyn Berezin has been appointed director of long range planning of office systems for Burroughs. Berezin was a founder and president of Redactron Corp when the company became a Burroughs subsidiary in 1976. She subsequently served as director of planning for the office products group and on the corporate product management staff as director of office automation products.

Varnald Sean has been named vice-president of field engineering, a new corporate management position, with NCR. He was formerly vice-president of the components and support division in the engineering and manufacturing group of the company. He will have responsibility for all field engineering operations.

Dr John Bass, managing director of Plessey's Allen Clark Research Centre, has also been appointed to the new position of director of research.

## ICL chief in America

THERE has been another change at the top of ICL's US company. RICHARD BRIGHT, who became president of the operation in October 1978, has left, and his place has been taken by THOMAS WOODHILL, head of the Canadian company, who will for the time being be responsible for both subsidiaries. Both he and Bright joined ICL when it acquired the international operation of Singer Business Machines.

## IDPM chairman

CHAIRMAN of the West London to Oxford branch of the Institute of Data Processing Management is now Colin Bendall of SIS Applied Systems, succeeding Chris Nunn of Marks and Spencer.

Maren Talbot of Rank Xerox, Ian Jones of LMR Computer Services, and Don Morgan of Express Dairies have been elected to the committee.

## Fleet on BETA

CHAIRMAN and managing director of NCR, Rex Fleet, has become a member of the council of BETA, the Business Equipment Trade Association. The association represents the interests in the UK of manufacturers and sole concessionaires of all types of business machines and systems, computers and peripherals and office furniture.

Princess Margaret inspected ICL's 7700 word processing system on the ICL stand at the British Hospitals and Medical Exhibition at Olympia. She was conducted round the ICL exhibit by the company's chairman, Philip Chappell, who is on her right in the picture.

## Durkin to be the next IEE president

PRESIDENT of the Institution of Electrical Engineers for the year 1980/81 will be Air Marshal Sir Herbert Durkin. He will take up his honorary office in October.

Sir Herbert has held the positions of vice-president of the IEE, in 1977, and deputy president in 1978. His RAF career included periods as director of engineering policy at the MoD, Air Officer Commanding 90 (Signals) Group, director-general of engineering and supply management at the MoD and controller of engineering and supply (RAF). He was awarded the KBE in 1976.

He is chairman of the board of Exploration Computing, which offers specialist and consultancy services to the mineral exploration business, particularly in oil.

## Head of National Engineering Lab

DIRECTOR of the National Engineering Laboratory is to be Paul Freeman, who has been director of the Computer-Aided Design Centre at Cambridge for the past three years. He replaces Dennis Mallinson, who retires in July.

Peter Brass has been appointed general manager of the business forms division of Kenrick and Jefferson, printers to the computer industry. He previously worked as general manager of the light machines division with Brush Electrical Engineering.

Leigh Collier has left Gemini to join the management consultancy division of chartered accountants Hays Allan, as a consultant.

David Lee has joined AM Jacquard Systems as European marketing manager. He previously worked for IBM for 15 years.

Udo Lichtenacker has been appointed European operations manager for the electronic devices division of Rockwell International. He was previously central region manager of General Instrument microelectronics division.

Frank Woodgate has become UK sales manager for Atlantic Computer Leasing. He was previously with Standard Chartered Leasing.

Don Devino of Datasaab has been appointed manager of financial terminal systems, and Ian Wright has joined the company as UK software manager.

John Parnell has left CTL, where he was UK sales manager, to take up a similar position with Allied Business Systems. Software manager Elizabeth Last has been appointed manager of research and development with Allied Business Systems.

Dr Andrew McLean has become software development manager with Videcom. Previously he was a microprocessor software engineer with Plessey Microsystems.

Liveware File

by Don

## DIARY

**JUNE 24-25**
Meeting. IBM CUA small systems group. Crest Hotel, Luton, Beds.

**JUNE 26-27**
Meeting. IBM CUA operations group. Unicorn Hotel, Bristol.

**JUNE 27**
Applications of microcomputers in civil engineering, conference and exhibition. The City University, Dept. of Civil Engineering, City University, London, 9.15. Details: Mrs Linda Gilroy, 01-253 4399 ext 210.

**JUNE 28**
Floating point systems users' group AGM. University of Surrey, Guildford, 9.30. Details: David Bish, 0483 71281 ext 470.

**JULY 2**
Integer programming approach to crew scheduling. BCS Mathematical Programming Study Group. London School of Economics, London. 6.30.

**JULY 3**
IBM Guide SET group meeting. IBM, Basinghall Street, London EC2. Details: Alan Peck, 01-828 8104.

**JULY 3-6**
Lawyers in the Eighties, conference and exhibition. Society for Computers and Law. University of York.

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# Real time Pascal a threat to assembler

A REAL time Pascal compiler, claimed to be only 50% less efficient than an assembler and to be three to four times faster than Fortran in real time applications, is on offer from Dietz for use with its minicomputers.

The small West German minimaker calls its new compiler System Pascal and claims that it compiles at a rate of 50 statements a second and reduces development time three or fourfold compared with assembler.

The compiler is the third generation of Dietz Pascal. The first was Pascal-E in 1977, a simplified version designed for people learning the language. Full Pascal followed in 1979 with the real time extensions being added this year.

Although spawned by Algol and originally used mostly for technical applications, Pascal is now widely used for writing systems software and is increasingly being adopted for all applications.

Among its attractions are that it is comparatively easy to write and that programs written in it are easy to maintain because one programmer's work can be fairly easily understood by another. Because it is block structured, unlike with Cobol, single changes do not require extensive related adjustments throughout the program.

The Dietz minicomputer line currently consists of the 621M, which is a low cost AMD 2901 bit-slice version of the processor, and 621X1, 2 and 3 processors, all of which are different.

The latter three are to be replaced with a single new TTL processor; emitter-coupled logic was rejected on the grounds that in harsh environments the voltage swings needed to switch ECL are so small that voltage spikes could cause problems.

In the year to December 1979, Dietz maintained its profit margins, turnover grew about 15% to DM 53 million (£13.3 million) and orders were up a healthy 25%.

Languages available on the Dietz minis include Basic, C-Basic, Basex (an experimental real time Basic), Fortran IV, real-time Fortran, Pearl, the three versions of Pascal and Ansi Cobol. There are also an assembler and a macro-assembler.

Dietz is stressing its X25 packet-switching protocol implementation, which includes full Level 1 to 3 of X25, plus what are called Levels 4 to 6. Not yet standards, these include virtual terminal support, transport service and file transfer protocol.

The virtual terminal facility enables any terminal also implementing the standard and attached to a packet network to communicate with a Dietz computer. The transport service defines call set-up and termination procedures, and the file transfer procedure allows data to be transported in bulk across the network.

The West German provincial government of Nordrhein Westphalen has implemented an X25 network using Honeywell Level 6 microcomputers at the three nodes in Dusseldorf, Cologne and Hagen. The network serves the province's data processing and statistics service. Other provinces are likely to follow suit, offering a strong market for Dietz computers.

## IBM edges ahead in Japan

LATEST market share figures from Japan show IBM edging forward again with 30.7%, up from about 28% last time figures were given. Fujitsu with 23.3% and Hitachi with 16.5% are also gaining market share, while Univac is surprisingly strong with 10.3%.

Nippon Electric is static with 9.5%, next comes Burroughs with 3.5%, while Toshiba at 2.2% is in decline. NCR has 2.2%, while the other two Japanese mainframers, Mitsubishi and Oki have almost dropped out of the list with 0.7% and 0.2% respectively.

Aggregating the figures of the top three companies suggests that the Gene Amdahl thesis that it is an IBM software world, holds abundantly true in Japan, since they share 70.5% of the Japanese market.

## PPS installed

A PAGE Printing System from Honeywell has been installed by Audits of Great Britain. The 8,000 lpm system cost £148,000 and will be used for producing market research and consumer panel reports.

## Services lead revival in fortunes of UK computer industry

THE latest set of statistics from the Department of Industry on the UK computer industry show a big drop in total sales of computer equipment between the fourth quarter of 1979 and the first quarter of 1980, while services grew by 30%.

Sales fell from £310 million to £264 million, and exports by UK manufacturers dropped from £228 million in the fourth quarter of 1979 to £213 million in the first quarter of 1980. But exports were substantially higher than in the first quarter of 1979 when the figure was £165 million.

Imports of computer equipment increased far less rapidly over the same 12 month period, from £246 million to £277 million.

The longer term performance of the UK industry indicates a significant growth in revenues, the overall sales figure for 1979 being £1,103 million, a very healthy 26% increase over 1978.

Exports grew by an even more impressive 32% to reach a total of £834 million last year.

● The UK computer services industry grew substantially during 1979 according to the latest Department of Industry statistics. The total value of business increased by about 30% — from £332 million in 1978 to £430 million last year.

Work done by computer services firms for their parent or associate companies increased by a relatively sluggish 21% to £109 million, but business with outside clients in the UK and overseas increased much more rapidly.

Total outside sales in 1979 were £28 million overseas, £53 million with public service clients in the UK and £240 million with other UK clients.

## $16m project

AS part of a $90 million US Navy project, Hughes Aircraft of California has been awarded a $16 million contract to supply eight of its AN/UYA-4 display consoles for use in guided missile fast frigates.

## BRS dating service for road hauliers launched

A REAL time system that could help to reduce the number of empty lorries in the UK by 3.5% and save 10 million gallons of fuel, has been developed by Tempo Computer Services for British Road Services.

Called Datafreight, the system stores data about loads requiring delivery and their location, with details of suitable available vehicles.

Over 30 BRS depots are currently linked via Post Office lines to a Systime 6700 computer at Tempo, and each depot is able to input data via a video terminal that then becomes available to other depots. The system allows for online amendments and updates as well as hard copy print-outs.

Datafreight is not limited to BRS and private owners can join for a fee of £75 plus £50 per lorry annually.

Tempo also grouped BRS depots into areas based on postal codes and provided training for both BRS staff and their customers. Work started on the system in February, 1979. It was developed using RPL11.

## 303X boost to delay IBM's H-series

● From front page

channels, but the new 3042 supports up to 12 channels of its own for a total maximum of 28 channels on a 3033AP system.

The new release of MVS, called MVS/System Product Job Entry Subsystem 2 and 3 — MVS/SP-JES — are designed to improve system and storage management, for example allowing direct communication between memory address spaces without the use of common virtual storage space.

With a data transfer rate of three megabytes per second, a capacity of 2,520 megabytes per dual spindle module and support only by MVS, the 3380 disc drive was clearly designed by IBM with the forthcoming H-series in mind. [illegible] are more than twice the com[illegible] 3350 units for four times the capacity.

For users of 303X and 370/158 and 168 machines two new versions of the 3880 controller will be available. The 3880 Model 2 will have two different storage directors, one for supporting existing 3330, 3340 and 3350 drives and the second for handling the 3380. Both storage directors on the 3880 Model 3 will only handle the 3380.

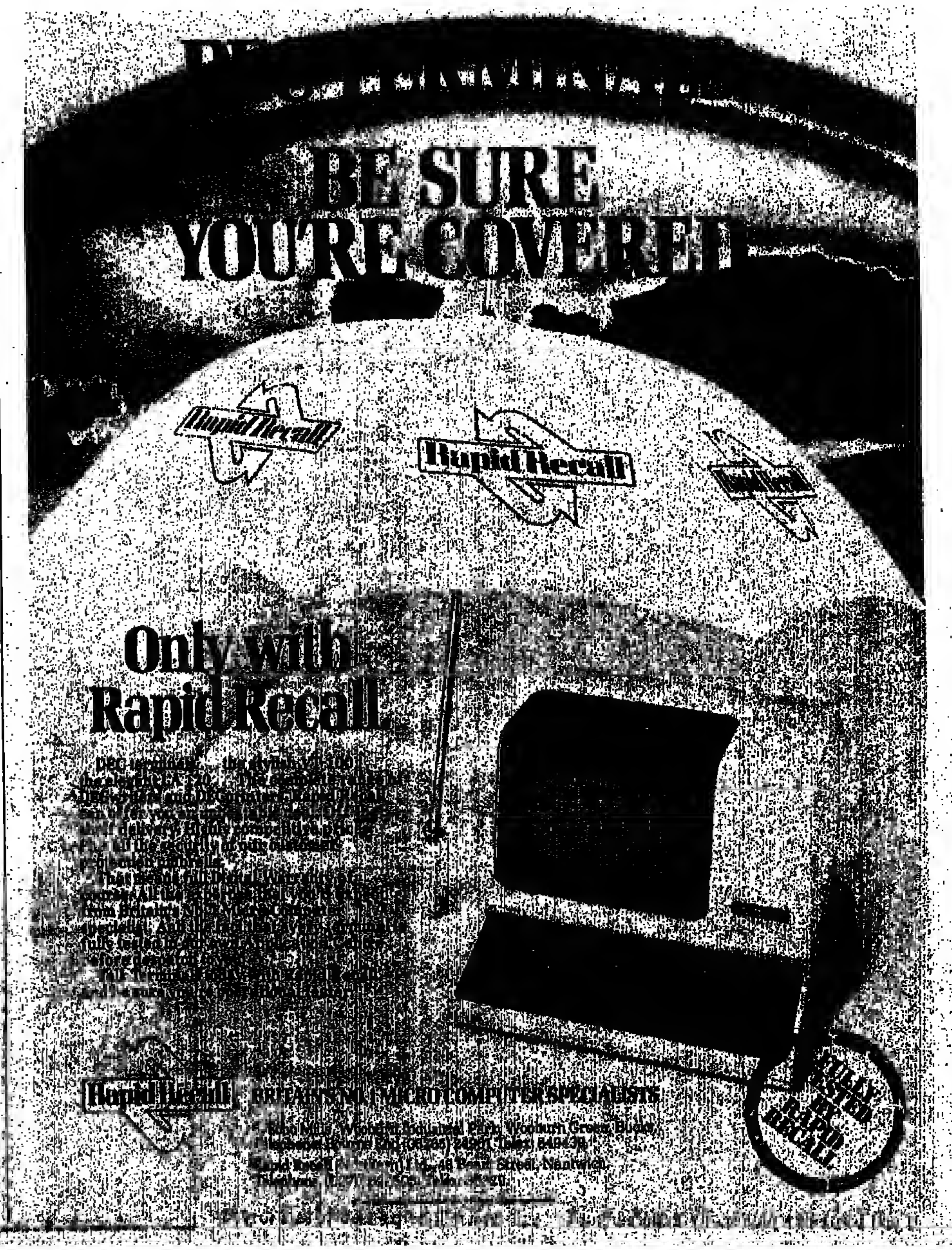
But directors for the 3380 will need the special speed matching buffer for reducing the data [illegible]

303X users only will be a new data streaming feature costing about £22,000 that will be able to speed up block multiplexer channels on a 303X CPU to three megabytes a second.

Plug compatible manufacturer Memorex believes that, for the H-series, IBM will introduce a modified version of the 3380 currently codenamed McKinley that will employ fixed block recording as opposed to the variable length or code key data recording used on the 3380 just announced. McKinley will also come with four head actuators instead of two to reduce contention. A version of the 3880 controller with a solid state cache and a dedicated tape drive for fast dump/restore is also expected with the H-series.

The other disc drive announced, the 3375, differs from the 3370 introduced with the 4300 series last year in employing code key data rather than fixed block recording. This difference probably accounts for the increase in storage capacity from the 3370's 570 bytes per spindle to 819 megabytes. IBM says that first deliveries of the 3375 will start in October 1981.

● Up to four 3880s make up a string; head of string A Model costs £81,142 or £77,908 with additional fixed-head feature while the B Model costs £44,396 [illegible] £143 with fixed head fea[illegible]



## MICRO NEWS

by Eileen Stainer

# Intel plans its next generation

THE key issue of this era is the silicon system and the next generation is likely to be extremely innovative in systems technology. No longer is it the case of programmers writing software to support hardware but during the last few years it has become increasingly apparent that engineers are designing hardware to support the software.

These opinions were aired by Dr Colin Crook, managing director of Rank Precision Industries, at this year's Seminex held at Imperial College. Now they appear to be holding true — Intel has announced its Microsystem 80.

Intel has combined its announcements for the future, previously called "Operation Crush", with a renumbering structure of its existing chips and systems. The result, Microsystem 80, projects a hierarchy comprising five levels of functionality from 8-bit to 32-bit.

In order of decreasing levels of systems integration they are: A 32-bit micromainframe called IAPX 432 and previously referred to as the 8800 (CW, March 6); a 16/32 bit micromaxi called IAPX 286; two 16-bit microminis called IPAX 186 and IAPX 86; three 8/16-bit microcomputers called IAPX 88, MCS-85 and MCS-80; and two 8-bit microcontrollers called MCS-51 and MCS-48.

The micromainframe is Intel's solution to the distributed processing problem and is said to have the power of an IBM System 38. It is described by Intel as "a 32-bit microsystem offering mainframe functionality and performance within a microcomputer form factor."

The 432 is said to open a technological concept, that of hardware and software integration within a package which displays system characteristics. It is an object oriented machine which, according to Tom Lawrence, Intel's vice-president for Europe, means that the data set is at a higher level than the bit or byte definition.

"An object is a data set which could be a microprocessor itself or a memory management unit," says Lawrence.

System operation is based around a modular software structure. The system commands its internal structure to define an object like a file management system or a floating point arithmetic logic unit and any module within the system can take on that object.

Programming has been made simpler by the use of Intel's own systems implementation language, SIL, which is register independent. Other languages are to be supported, but the only one announced so far is Pascal.

More details of the 432, and the rest of Microsystem 80 are to be announced at the Intel Fair on June 24. Meanwhile it is thought that the system will have an extensive addressing range of 4,000 megabytes ($2^{32}$) which will support from 256K to 8 megabytes. Intel hopes to provide limited quantities of the 432 towards the end of this year.

Lawrence defined the micromaxi as a 16-bit system with increased functional capability. It involves advanced integration of hardware and software so that the system possesses its own DMA channel and the kernel of an operating system. The micromini is a 16-bit system without functional integration, but with co-processor operation.

The IAPX 286 basic comprises a CPU, an I/O processor, a numeric processor extension and operating system firmware. From this a complete family of 286/xx systems evolve with differing combinations of the four basic units. They all use ASM and PLM system languages and Pascal and Fortran applications languages.

The IAPX 186 appears to be an enhanced extension of the 86 and 88 systems and is code compatible with them for certain applications such as personal computers, word processors, intelligent terminals and controllers. It also has operating system firmware support.

Three units comprise the IAPX 86: the 8086 general data processor; the 8089 I/O processor, and the 8087 numeric processor extension. Again, all combinations of these constitute the 86/xx family, and likewise with the IAPX 88. Key architectural features of both families include one megabyte address space, co-processor extensions, 16-bit internal data path and hardware multiply and divide.

Both micromini systems, IAPX 186 and IAPX 88 use ASM and PLM 86 system languages and Pascal and Fortran applications languages. The microcomputers, including the IAPX 88, use ASM 80 and PLM 80 systems languages and four applications languages, Pascal 80, Fortran 80, Cobol 80 and Basic 80.

Meanwhile, Intel has plans for Europe. A 13-acre site with a 100,000 sq ft building, in Swindon, Wilts, is to become the UK headquarters. According to Lawrence, major activities will be carried out there including some international functions. The company is also interested in setting up a plant in Eire. Announcements will be made on July 14, Bastille Day, on whether Intel will be venturing in France with Matra-Harris.

LAWRENCE . . . An object is a data set which could be a microprocessor itself or a memory management unit.

# Intelligent peripheral controller first in latest range of 68000 devices

DETAILS of more devices in the 68000 family have been announced by Motorola and are expected to be available over the next two years.

An intelligent peripheral controller, called the MC 68120 and due for sampling in autumn, will be the first available. It has a 6801 8/16-bit processor on board, an enlarged instruction set, 2K-bytes of ROM, 21 I/O lines, a serial communications interface, 128 bytes of RAM and a 16-bit counter. A typical application is an asynchronous printer controller.

Also due for sampling in the autumn are the MC 68122 terminal node controller for supporting peripherals and the MC 68540 error detection and correction chip. The 68540 will carry out double bit error detection in 16-bit data and can be cascaded for 32-bit data.

Due for sampling in spring 1981 is the 68451 memory management unit which will support virtual memory and real memory up to 16 megabytes, and perform address translation.

Samples of the 68230 parallel interface timer are expected in summer, 1981. This will handle I/O interrupts and generate synchronous pulses.

A direct memory access controller is planned for sampling in summer, 1981. Designated MC 68450, it is built around the 68000 and will have a transfer rate of 4 megabits/second. Hitachi is developing it in a technology agreement with Motorola.

Two other chips are expected to be sampled in 1981. The first, 68581, is a communications controller which will handle SDLC, HDLC, bisync and X25 communications protocols. The second, 68341, is a ROM programmed for floating point operation.

Motorola is considering the development of four other peripheral chips including double port RAM, the 68340, a bubble memory controller, the 68453 (which Rockwell will develop under its agreement with the company), a direct memory access processor in the 68540 series, and disc controller, the 68454.

Motorola is delivering the US 4MHz versions of the 68000, but 8MHz versions are expected in the autumn.

## 1980 edition of IC Master

THE 1980 edition of the IC Master was introduced at this year's All Electronics Show. It costs £52.50 from Paterson Steedman and Partners, 34 High Street, Saffron Walden, Essex.

## New shop opens

PET dealer DeVinci Computer has expanded into new shop premises at 85 Edgware High Street, Middx. Tel: 01-952 0526.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# ICL plans to boost its US turnover tenfold

BEHIND ICL's radical reorganisation of its US business (CW, January 31) lies an ambitious plan to boost turnover there from its present meagre $18 million to about $200 million in five years.

Main thrust of the market drive continues to be the products inherited from Singer and developed further by ICL, notably the 9500 point-of-sale terminal, which has scored an order for between 400 and 500 terminals with 40 System Ten controllers from an unnamed US customer.

The new System Ten 120 was launched with different peripherals in the US as the System Ten 320, and the company is now selling these products, and the 1500 terminal computer, from its new distributive systems division based at Irving, near Dallas, Texas.

Headquarters of its sales operations for native ICL products is now Falls Church, Virginia, close to Washington. The advanced systems division is selling the 2950s and 2956s in existing customers who have outgrown their 2903/4 machines and want to run the DME/2 emulator, and large 2900s with the back-end Distributed Array Processor. Target market for these is the oil industry, research establishments and colleges, and bodies doing image processing.

The 2903/4 machines have been sold for about five years in the New York area, and along the Boston-Washington "corridor". Installations, including a couple of customers who have upgraded to 2950s, still only number about 20. Over 30 have been sold in Canada.

The ME29 replacement for the 2903 series was launched in New York last week and has been introduced in Canada.

A third division, customer service, remains at the former ICL Inc headquarters at East Brunswick, New Jersey. It will be responsible for maintenance and service on all products sold by both marketing divisions.

# Warning to West End shops

SHOPS in the West End of London have been warned that they could be breaking the Trade Descriptions Act by selling the Florida-made Bridge Challenger, an electronic card-playing game (CW, January 17). The warning has come from Westminster Council trading standards office, which felt the £300 machine's advertising exaggerated its playing ability. The importer, Computer Games of Barking, is reconsidering the wording of its brochures.

# 'Data and voice networks will develop separately'

## —US PROFESSOR TELLS INFOTECH SEMINAR

DATA networks will develop separately from voice networks in the Eighties and will use satellites almost exclusively. Voice networks will make little use of satellites, even though users can quickly adjust to the worst feature of satellite voice links — the quarter-second delay.

These are the views of Dr Norman Abramson, of the University of Hawaii, who conducted an Infotech seminar in London on Satellite Data Communications.

His opinion on the separate development of the two types of network echoes that of Donald Davies, of the National Physical Laboratory, expressed at a conference last year, but it flies in the face of British Telecom's plans for the integrated services digital network based on System X.

The separation was particularly likely to happen in Europe, Abramson said, because the difficulties of sending data via voice lines were greater than in the US. British Telecom is known to be taking a close interest in satellites, but it expects their operation to be a PTT monopoly throughout Europe.

Abramson said the evidence to support his assertion could be seen in the number of satellite data networks planned in the US: SBS by IBM and partners, Xten by Xerox, SDX by Continental Telephone, and Dynac by Digital Computer Corp.

GTE Telenet planned to use satellites in its existing packet network by 1982, and every major US data network operator was planning to use satellites.

The rationale behind the heavy use of satellites lay in two main factors. One was the "connectivity" provided by a satellite network: any station could call any other station directly, without complex hop-by-hop connection paths.

The other was that costs were falling so rapidly that satellite capacity now cost only $400 a year per channel, which could be virtually ignored. Ground stations, too, had fallen from $3 million for a system based on a 30 metre dish antenna in 1965 to $37,000 for a five metre dish-based system in Alaskanet in 1976. This was also the price at which Texas department store Nieman Marcus had last Christmas entered a receive-only ground station in its mail order catalogue.

Many amateurs, however, were now receiving over 40 television channels from the cable television companies' distribution system on ground stations costing from $15,000 to only $2,000.

Ground stations in use with US domestic satellite systems had grown from 800 in 1976 to 2,000 last year, and 4,000 were expected to be in use by December. Holiday Inns alone were planning to install 200 a year for several years.

## Supplies firms merge

COMPUTER supplies firms Cavendish King of Richmond, Surrey, and the Computer Supplies Company of Henlow, Bedfordshire, have merged to form an organisation that is expected to chalk up a turnover of more than £2.5 million in its first year.

Called Cavendish King & Computer Supplies, the new company will continue to operate from the existing offices of the two merged companies.

The Cavendish King side of the new firm is a marketing organisation which also provides magnetic media services.

## Racal-Milgo first UK plant

THE first UK manufacturing plant for Racal-Milgo has been opened at a former Racal Communications plant at Chesford Grange, Worrington. The plant will employ, and probably add to, the 130 staff, and will build modems and add-on printed circuit boards.

# Industry plea for City backing

IN a financial survey of the UK computer services industry, published by Jordans, information is provided on 179 companies. Of these, 50 are analysed in depth with financial figures for four years.

The author, Joseph Roth of Business Industrial Management, says that the computer industry, which is expanding at 20% compound a year, needs urgent support from the City's financial institutions. This has not been forthcoming over recent years, he adds.

The survey is available, price £80, from the publishers Jordans Surveys, Brunswick Place, London, W1. Tel: 01-252 3030.

# Turnover 10% ahead of plan at Univac

WITH turnover 10% ahead of plan and orders 20% up, Univac's UK subsidiary closed its books on a satisfactory year which ended March 31.

Previewing the results, managing director Bill Read reported that the 1100/60 bit-slice mainframe had been particularly successful, with 15 orders in the UK, 76 in Europe, and 225 worldwide.

The 1100 series, which consists of two current models, the 1100/80 and 1100/60, now accounts for two-thirds of Univac's business worldwide.

The other big seller for Univac in the past year had been the V77 minicomputer which now accounts for 10% of its UK business. For 1980-81, the company plans to increase the growth rate of the minicomputer operations even further.

A major change is that sales of V77 minis to OEM systems builders for packaging as business systems is being handled by a new general services operation, GSO, which will also take in the BC/7 office computer, previously marketed by a dedicated sales force, and data entry systems.

For this financial year, Univac UK has set itself an overall target of 30% growth in orders and 35% growth in turnover.

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# T-85 'just below power of Sigma 9'

THE Telefile T-85 plug-compatible replacement for the Xerox Sigma 9 has at last been unveiled. The company has also introduced its emulator for the Lockheed MAC minicomputer, which it calls the TCP-16/5, but its other emulation project, a replacement for the 24-bit GE 400, has been put on ice.

The T-85 is claimed to be just below the power of the Sigma 9, and two further models, a T-81 and a T-87, are planned.

Xerox introduced a multi-processor version of the CP-V operating system just before it pulled out of the computer business. The operating system is capable of running up to four processors, and Telefile has developed an enhanced interrupt scheduler which makes multi-processing configurations much more efficient; its target is to increase throughput by 80% with the addition of a second processor.

The first Telefile release of the software is to be called GOO, and features a "red overflow" facility which gets round the problem that when a fixed head disc overloaded, the system crashed. Instead, the system starts writing to a moving head disc.

Telefile is offering the new release, set for July 1, to existing Xerox users as well as customers for its T-85, and will be charging a licence fee for it. Up-to-date Cobol and Fortran have been added, and Telefile hopes to pick up a Pascal compiler developed at the University of Montreal.

The company has nine orders from the existing base so far, and in the UK Atkins Computing, now owned by On-Line Systems, and a long-time Xerox user, is keen to have a new machine.

Telefile hopes to win users for its T-85 from outside the Xerox base and is targeting the whole of the educational, time sharing and scientific markets. Enhancements planned include the addition of special back-end processors for things like fast Fortran execution.

Reason for doing the Lockheed MAC emulation is that the company originally adapted the mini for use as a front-end processor for IBM 360 mainframes. Lockheed then dropped it after introducing the incompatible Sue mini. Telefile now offers the MAC emulation as a front-end for Sigmas and the T-85.

Both the T-85 and the TCP-16/5 use the AMD 2901 bit-slice microprocessor, eight in the T-85 CPU and four in the 16/5.

## Japan's big slice of US market

UNDERLINING the inroads being made by Japan into the US computer industry, Tokyo broker Okasan Securities says that Japanese companies have 42% of the US market for 16K RAMs and look set to get 50% of the 64K RAM market.

The brokers also say that world semiconductor production in 1979 amounted to $10,500 million, with $7,035 million coming from the US, $2,310 million from Japan and $1,155 million from Europe. In 16K RAMs, the total was 86 million, with 32.5 million coming from the US, 23.9 million from Japan and 6.5 million from the rest of the world.

## Amdahl software for IBM users

PROPRIETARY software, such as the MVS/SE Assist for 370/168 systems, is to be offered to IBM users by Amdahl (CW, June 29, 1978).

MVS/SE Assist is not yet included in the programme, which so far involves only the VM Performance Enhancement, VM/PE, and begins in the US in July. VM/PE enables one copy of MVS or SVS to run under VM/370 with very little overhead compared with running the operating system in native mode, so that the production workload can be run efficiently while, say, a new release of MVS is being tested.

Amdahl users pay $1,750 a month for VM/PE. The price to IBM users has not yet been set.

# Pertec will stay independent—Poppa

"AS a result of our acquisition by Triumph-Adler, we will be spending $2.8 million more than we would otherwise have done this year on research and development, and $5.2 million more on marketing."

This was the enthusiastic view of Ryal Poppa, founder and head of Pertec Computer Corp, acquired last year by Triumph Adler using money from its ultimate parent, Volkswagen.

"Some European acquisitions have gone badly," he commented, naming no names, but making it clear that Triumph-Adler-Pertec was to be the exception. "The independence of Pertec will be preserved; there has been no backbiting and no jockeying for position."

The future of the combined company would be in office automation.

"We do not yet have the communications and switching technology, but we will either gain it through a joint venture or develop it ourselves. If you put Volkswagen, Triumph-Adler and Pertec together you are talking about a $16,000 million company, which means that we are big enough to go into the semiconductor business in our own right. I'm not saying that we shall, but we can if we need to. And people may say that that $16,000 million is overwhelmingly Volkswagen — all those little Beetles running about — but we will do a combined $1,000 million in data processing this year."

Poppa revealed that Pertec plans to launch the new TA 1830 business computer in the US in the next few months, and that because it was now available, Pertec had killed its own 16-bit development project to provide an upgrade path for the PCC 2000 business microcomputer. The PCC 2000 is driven by the Intel 8085A while the TA 1830 is built around the Texas Instruments TMS 9900 16-bit chip.

The Pertec product line in the US now embraces peripherals, small systems, data entry systems acquired with CMC's US operations such as the 2000, and the more recently developed XL series, plus Triumph Adler products, the first being new printers introduced at NCC.

The deepening recession cast its shadow over many of the talks at NCC, and Poppa adduced evidence that it is beginning to bite.

"We are seeing long-term customers seeking delivery of 30 tape drives in December where we would have expected them to take 100, while delivery times for 16K RAMs have fallen from 36 weeks, to eight to 12," he said.

"We are taking action to cope with the problem, improving our inventory management and slowing down our marketing effort, and we hope to get through by attrition — people leaving without being replaced — and avoid having to make any lay-offs.

"It is always a traumatic experience for a chief executive officer to have his company acquired from under him, but I am very pleased with the sale to Triumph-Adler. And I'm learning German!"

## Dial-up newspapers in Columbus, Ohio

AN online newspaper in the home is being made available to any member of the public in Columbus, Ohio, who has a terminal or home computer with communications facilities.

The local evening paper, the Columbus Dispatch, has established a link with a bureau by which news stories are automatically fed from the newspaper's typesetting computer to the bureau's dial-up machine.

The bureau, Compuserve, has a personal computing network aimed at hobbyists as well as a more conventional dial-up service, and any member of the public will be able to interrogate the newspaper files at a connect-time rate of about eight cents a minute. Three levels of indexing are provided: a general area such as "sport" or "politics," a more specific area such as "local," "foreign" and then the headlines of the individual stories will be displayed for the reader to choose the one he wants.

Only one day's stories will be held online at a time, on the bank of PDP-11s run by Compuserve. For the time being there will be no attempt to develop an historical service.

The Dispatch has little idea now who the potential customers for this service are and what they want, and the aim is to get a feel for this. Advertising is expected to be added to the service eventually, with the Sunday Dispatch. Home computer users would be able to store news items for future reference on their own machines.

## Online 'mug shots' help cops catch robbers

ALTHOUGH many of the New York City police department's computers are used for such routine jobs as arranging personal files and keeping track of parking violations, one system is used to aid police in rounding up sex offenders and hunting down robbers. This is the Computer Assisted Terminal Criminal Hunt system — CATCH.

Catch is an electronic file of arrest photographs, the so-called "mug shots". The likelihood of identifying a criminal from a mug shot is not very good, and police records from the Bronx for 1978 show that witnesses who had pored over thousands of photos, were able to point to a perpetrator only about 13% of the time.

Although Catch is new, statistics show that viewers make identifications about one-third of the time.

When police investigate certain types of violent crimes, they try to get as complete a physical description of the criminal and his modus operandi as the witnesses' muddled memories permit. These descriptions are then keyed into Catch, which goes through its photo files and picks, on average, about 40 mug shots which fit the description. Because witnesses have a relatively small number of pictures to peruse, it is easier for them to spot a criminal.

In order for Catch to be useful the criminal must have had a previous arrest and thus, a mug shot. According to Sgt William Stritzl, Catch's co-ordinator, about 80% of New York City's violent crimes are committed by such "repeaters".

Catch was designed in 1975 by First Deputy Commissioner William Devine when he headed the Police Department's Management Information Systems Division. Captain Raymond Hart and Police Officer Frederick Guerra, of the MIS designed the Catch software.


# Yesterday's branch office

# Today's*

Branch office of the future, but available now – that's the Model 745 Portable, from the "Silent 700*" series of electronic data terminals. It gives representatives immediate access to computerised data wherever there's a telephone and power point.

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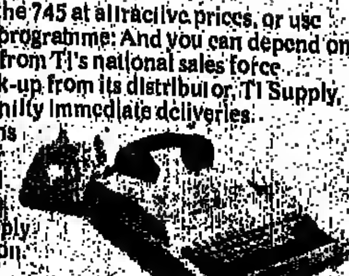

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# German Prestel available on ICL

THE availability of Prestel-compatible database software on the ICL ME29 replacement for the 2903 should get the new machine off to a flying start in the West German market.

The test trial of Bildschirmtext, the German version of the British Post Office's Prestel viewdata system, is due to begin in Dusseldorf this month, and the Germans plan one significant difference in the way it operates.

Initially, information providers will store their data on GEC 4000 series computers run by the West German PTT, but any information provider with compatible software on his machine will be allowed to own and operate his own computer attached to the Bildschirmtext network.

So far ICL is the only company able to offer this software on its computer in Germany.

In the experiment, which will be followed by another in Berlin starting later in the year, 1,000 information providers will serve 2,000 domestic subscribers who have been carefully chosen to be a representative mix of the West German population. There will also be 1,000 business users, organised into closed user groups.

German manufacturers seem to have taken to Bildschirmtext with more enthusiasm than their UK counterparts: six companies are now offering editing terminals for information providers, and 16 companies are producing adapted television sets or terminals for the system.

Among the companies exhibiting Bildschirmtext equipment at Hannover was Siemens, with an editing terminal which supports a reader for pictorial information. A picture or graphic is scanned in 30 seconds and the digitised information is either transmitted or stored.

AN underground rail network carrying iron ore from about 50 gravity shafts in the Kiirunavaara mine at Kiruna, northern Sweden, is controlled by a dual OS104 system from ASEA, the Swedish industrial conglomerate. The system controls the flow of ore via the trains, through a crushing plant to the hoists which take it to the surface. Heart of the system is the central room (above) from which all operations are monitored. The railway is part of an integrated production system installed by ASEA.

## 150 for Nasco Europe

WITH installation of an AS/5000 at VZ Heidelberg, the data centre for the city and local area authorities, early in May, National Advanced Systems Corp has achieved its 150th sale in Europe since it started in 1977.

The company says that it has sold more IBM-compatible processors in the past four months than its predecessor Itel achieved in any four-month period.

The Heidelberg machine is installed alongside an IBM 370/148 and runs under VM and DOS/VS. It was chosen in competition with IBM, against a 4341 which ran well when lightly loaded but ground down under a realistic workload, according to the customer. IBM then bid a 3031 but the Nasco offering proved substantially cheaper.

## DM2 million order for Alphatronic system

A MAJOR success has already been scored by the Triumph-Adler Alphatronic personal computer, with a DM 2 million German Post Office order for up to 300 units. The machines are to be used as standalone information systems on client telephone orders.

The Alphatronic is built around the same Intel 8085 micro as the company's new US acquisition, Pertec's PCC 2000 personal and small business computer. Designed by SKS of Karlsruhe and now manufactured by Triumph-Adler, the Alphatronic comes in four versions, two for the educational market and two for professionals. Languages supported are Basic and Pascal. It comes with keyboard and display and is offered with several Triumph-Adler printers including a golf-ball and a rotational thermal printer which prints at 2,000 cps on metallised paper.

The PCC 2000 from Pertec features Basic, Cobol and Fortran, and is at the top end of the personal computer market, falling into the $15,000 to $20,000 price bracket.

Principal operating system on the PCC 2000 is Pertec's MTX, and the company introduced at NCC in Anaheim a new business package called Magic, Managerial Accounting for Generalised Information Control, which includes eight modules: order processing, invoicing, accounts receivable, sales analysis, inventory management, accounts payable, payroll and general ledger.

The package is written in Basic and dealers in the US will pay an initial licence fee of $2,000 and $1,500 per copy thereafter.

## IBM problem resolved

IBM has resolved a spot of bother in France over its inability to ship a System 38 on time to kitchenware manufacturer Tefal.

The company took IBM to court complaining that it advertised and took orders for a "non-existent" machine.

Tefal cancelled its order when it found IBM could not ship System 38, but the two parties have reached an agreement which IBM France says does not imply "any recognition of liability on either side."

## Fujitsu moves into Australia

A BIG share of the Australian market is being won by Fujitsu with its M series of medium to very large mainframes. Up to the end of March, 61 systems had been sold. In addition the company sold three Amdahl 470V series machines.

Fujitsu made a nominal profit in the year of $Aust 10,000 (about £5,000) on sales of $Aust 43 million, about £22 million.

Australian orders have been won from ICL, Honeywell and DEC customers as well as IBM.

## Data encryption committee

THE American National Standards Committee has set up a technical committee on data encryption and asked it to write a draft for a national standard on techniques for incorporating the US standard DEA data encryption algorithm into communications systems.

The new committee is meeting for the first time at the Computer and Business Equipment Manufacturers' Association in Washington DC which is to give it secretarial support.

## Low-cost Réalité

A LOW-COST version of its Réalité 2000 mini-based business system has been introduced by Intertechnique in France. Called the IN 200, it is built around a bit-slice emulation of the original Microdata minicomputer Intertechnique first built under licence.

The IN 200 uses the AMD 2903 4-bit micro, which is an enhanced version of the 2901, and is aimed at OEM systems builders. It comes with the Réalité software. Intertechnique sold 759 Réalité 2000s in 1979.

Intertechnique has also launched its first microcomputer. Called the IN 55 and built around twin Zilog Z80 micros, it includes a 1,920-character screen, twin floppy drives with a total of one megabyte and typewriter keyboard in the central unit. Programming is in Basic or macroassembler.

## Terrorists strike

ICL's Toulouse office is the latest target to be hit by the Terrorist Committee for the Liberation or Destruction of Computers. The group, which has already attacked CII-HB and Philips offices in the region, set fire to the ICL office and daubed slogans saying "Non à l'Informatique" and "Non à Big Brother." Some ICL 1500s were damaged, but the company reports business as usual in Toulouse, despite the attack.

## Logabax seeks twin

A PARTNER, which the French government insists must be a national rather than a foreign company, is being sought for OEM peripherals and small systems manufacturer Logabax, which lost close to £10 million on turnover of about £50 million. Talks have been held with CGE, Thomson and Intertechnique.


# CENTRONICS PRINTERS

## Available ex-stock from UKS

Cable & Wireless UKS, the official service agency for maintaining Centronics printers in the UK, can offer immediate delivery and installation.

| Centronics 700 Series | | Basic Price |
|---|---|---|
| Model 700 | 60 cps | £1050 |
| Model 701 | 60 cps | £1164 |
| Model 702 | 120 cps | £1250 |
| Model 703 | 180 cps | £1475 |
| Model 704 | 180 cps | £1525 |
| Model 730 Parallel | 100 cps | £ 525 |
| Model 737 Parallel | 50-80 cps | £ 590 |
| Model 737 Serial | 50-80 cps | £ 625 |
| Model 730 Serial | 100 cps | £ 555 |
| Model 753 | 150 cps | £1821 |
| Model 761 RO | 60 cps | £1371 |
| Model 761 KSR | 60 cps | £1477 |
| Model 779 | 110 cps | £ 895 |
| Model 780 | 60 cps | £ 974 |
| Model 781 | 60 cps | £1079 |

700 Series Stands £80 Acoustic Hoods £48

| Centronics 6000 Series | | Basic Price |
|---|---|---|
| Model 6300 | 300 lpm | £2958 |
| Model 6600 | 600 lpm | £3892 |

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Model 6150 150 lpm £2000
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Model 101A £1500
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Model 306SC £1700
Fully configured with 5 x 7 dot matrix, audio alarm, inhibit delete code and character density switch.

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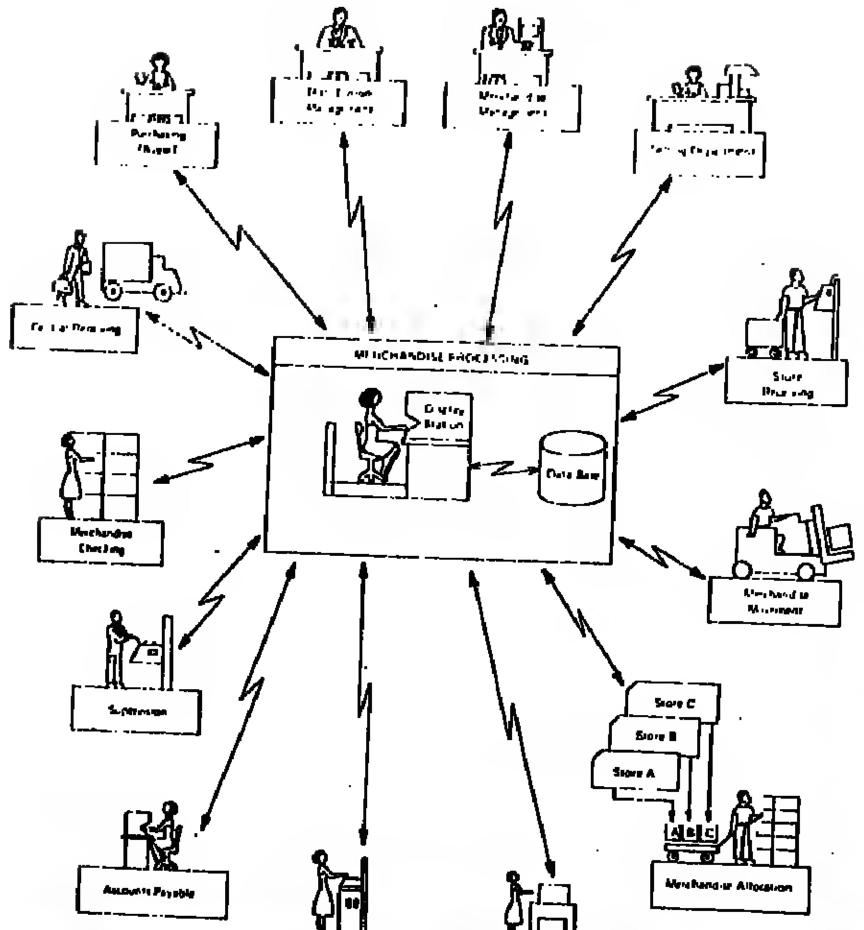

IBM's view of computers in retailing.

# Bar coding boosts use of PoS kit

## by Nicholas Benwell

COMPUTERS, as far as the observant consumer is concerned, crop up in a variety of different ways nowadays. Take one of the most eiaborate examples: Prestel. In some of its files, Prestel offers perhaps the most stylish form of computerised shopping. Recently it included a guide to the best dirty bookshops (CW, March 6) that led to five plain-clothes policemen visiting one of them and removing hundreds of erotic novels, magazines and films. Post Office chairman Sir William Barlow has called for a report.

**This is the first article in a series of three which examines recent developments in applying computers at the points of sale in shops. The second article will elaborate on their use in supermarkets while in the third Nicholas Benwell will discuss department store applications. Benwell is a lecturer at Cranfield Institute of Technology.**

Other applications of computers in the retail trade tend to be somewhat less disconcerting and involve more mundane aspects like stock control and check-outs.

The first serious attempt to decide whether computerised check-outs would be economic in the UK was made some six years ago by the Institute of Grocery Distribution.

It published a report[1] which examined the value of a standard product numbering system and it decided, on the evidence available in 1974, that there was value in adopting a standard system, but only if it was used in conjunction with suitable code-scanning equipment and then only in the long term.

What then, has happened since 1974 to have induced the current substantial investment in computers in shops? The biggest slice of the retail trade is the supermarket sector. So it was here that the installation of a standard numbering system was essential if the spread of computers from the stockroom or warehouse was to reach other parts of a typical widely-distributed supermarket organisation. It is reported[2] that nowadays over 65% of goods sold in US supermarkets are bar coded and are hence capable of being checked by electronic scanners.

This is made possible by a remarkable voluntary agreement between the US food manufacturers and the US food retailers. The agreement covers the standard numbering of the various products by means of a bar code in the food processing factory or warehouse and the computerised reading of that same code at any of the innumerable points of sale situated anywhere in the US.

The Universal Product Code (UPC) is used and the one that is being adopted throughout Europe (ensuring that the universal code is anything but universal) is of a similar form and is called the European Article Number (EAN).

The allocation of numbers is much the same for both systems and is handled by a national authority which, in the case of the UK and Eire, is the Article Numbering Association (UK) Ltd.

On the payment of a fee, a food manufacturer is issued with his own unique four or five digit number. The rest of the EAN number that is bar-coded on to the goods contains two digits for the country which issued the number, either five or six more digits for the manufacturer's own use and finally a check digit.

In order for the system to work smoothly each product that is manufactured has to have a different number. For example, instant coffee granules is different from instant coffee powder and each pack of either, whether it is 50g, 100g, 200g or more, must also be coded differently.

Additional numbers for each variation in the packaging — for example, glass, tins, plastic cartons or cardboard boxes — are needed. Hence the need for five or six digits per manufacturer.

Some of the major computer manufacturers — IBM, ICL and NCR — are making considerable headway now in providing their own computerised retailing systems for many UK retailing chains. But what can be constructed without using those brand leaders? Stuart Rickler of GTS has published the following price lists:

**ANY SMALL RETAIL OUTLET**

| | £ |
|---|---|
| VDU | 800 |
| Cash drawer | 250 |
| 20 column receipt printer | 450 |
| Cassette | 800 |
| Total | £2,200 |

This assumes there is a separate computer centre to carry out the processing.

**ANY SUPERMARKET WITH EIGHT POINTS OF SALE**

| | £ |
|---|---|
| Keyboards/displays | 2,400 |
| 20-30 column receipt printers | 3,600 |
| VDU | 650 |
| CPU + 20 mbyte discs | 9,000 |
| 1 report printer | 1,700 |
| | £17,350 |

or, £2,169 per point of sale including processing the data.

Note: no allowance has been made for software in either scheme.

How has the retail industry responded to these innovations? The replacement in 1971 of nearly every cash register in the country, because of decimalisation, is felt by some people in the retail trade to have been the main reason for the somewhat sluggish response to the call for even more investment in point of sale hardware when it first became computerised.

But decimalisation was nearly 10 years ago. As those cash registers are now nearing the end of their economic life, many will need replacing anyway.

Another problem for the shop managers during the 1970s was the uncertainty that was created by the withdrawal of Pitney Bowes from the PoS market and ICL's takeover of Singer. They were also keen to see how well the arrival of computers in the US retail trade was received.

IGD's second report investigates what the state of the art is in 1980 in the UK PoS scene in supermarkets. The report's first conclusion is that the effect of electronic developments at the point of sale with the widespread use of an article numbering system, could produce as big a retailing revolution in supermarkets as the self-service revolution of the 1950s.

It sees the effects permeating through many industries including computer equipment manufacture as well as data processing. It also concludes that 70% to 80% of products by volume must be bar-coded before the investment in the necessary system (more than £10,000 per point of sale) is worthwhile.

It took four years to achieve that level of bar-coding in the US, but the report suggests that Europe is likely to do it quicker. Informed opinion on which year the UK will reach that 80% threshold ranges from 1981 to 1983, with some Jeremiahs thinking that it will not happen even by then.

Nevertheless, it is revealed that at least six of the 10 leading UK supermarket chains are carrying out tests with fully computerised PoS systems. As those six chains have a turnover of about £4,000 million a year and currently hold two-thirds of the UK's total grocery sales between them, such a level of activity must indicate a powerful commitment to the idea.

**REFERENCES**

1. Evaluating the feasibility of SPNS in the UK grocery industry by IGD. (This report is now out of print.)
2. Survey of point of sale systems by IGD. £45 to non-members. IGD, Grange Lane, Letchmore Heath, Watford, Herts.


# CaveTab. Now the total system that cures all tape storage and ID hang-ups.

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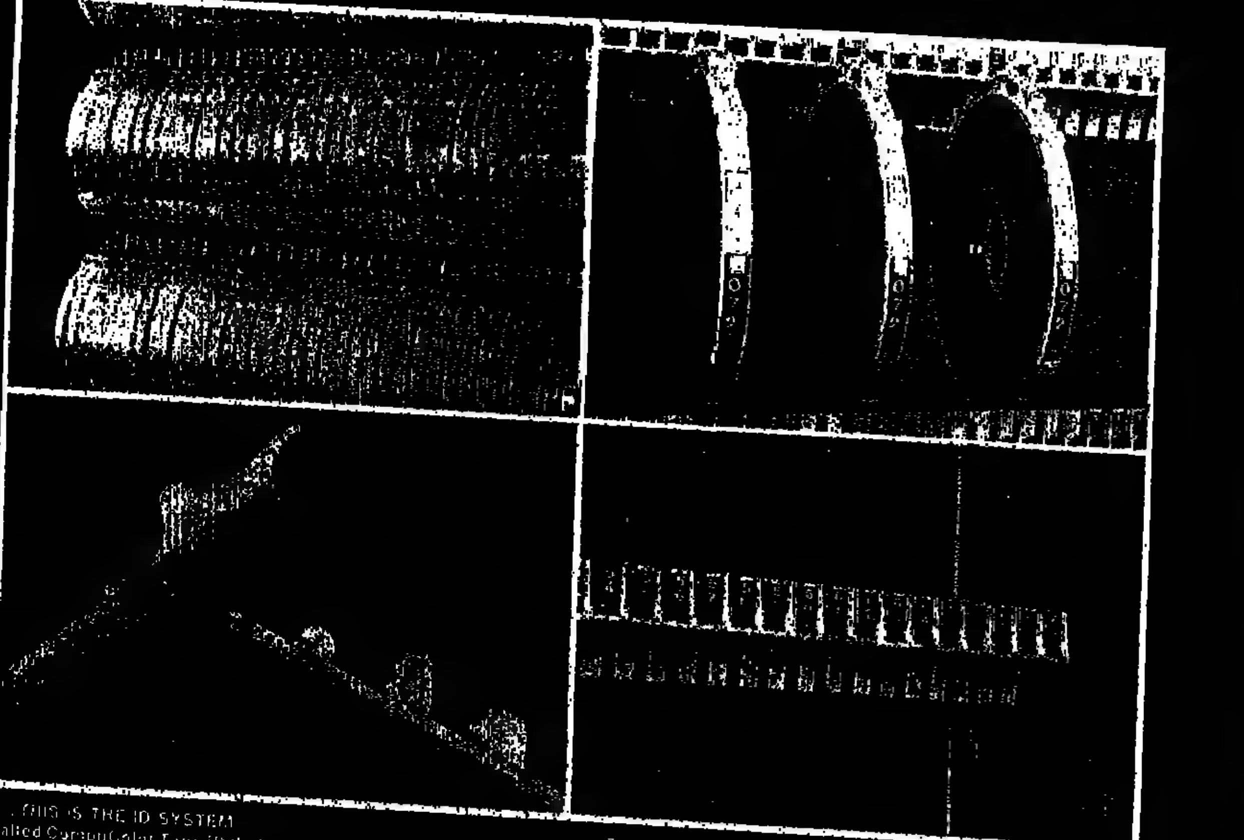

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# Data General wins factory 'arson' case

THE six-year-old legal action against Data General in the US in which computer hardware manufacturer Keronix claimed that DG had hired people to set fire to its factory at Santa Monica in California, has been dismissed by California Superior Court Judge Laurence Rittenband.

The judge also dismissed Keronix claims that DG had hired private detectives to wire-tap Keronix phones, and allegations of unfair competition and interference with Keronix customers by DG.

But Keronix has now filed an anti-trust suit against DG in the Federal District Court for Northern California, while a DG action against Keronix for alleged misappropriation of DG trade secrets and proprietary information relating to design and memory manufacture has just started in the California Superior Court.

● Meanwhile, Digital Equipment has just settled its three-year-old action against Electronic Memories and Magnetics by agreeing to a licensing deal that allows EM&M to build heavy duty versions of the PDP-11 for military and avionics use. DEC's suit, filed in the Boston Federal Court, claimed that EM&M had produced two microcomputers that used DEC software in violation of patents.

DEC has also settled its litigation with Ampex which started in 1977 and involved anti-trust, trade secret and patent claims relating to computer products. The terms of the agreement, described by both parties as "amicable," are confidential, but call for the dismissal of all claims made by either party against the other.

# Array processing at 10 million instructions per second

ARRAY processing at 10 million instructions per second is offered by the AP 400 from Analogic. This one cubic foot box costs as little as £12,500 and it can interface with Digital Equipment, Data General, Hewlett Packard and Perkin Elmer minicomputers.

Analogic points out that the AP400 is considerably less expensive than competing array processors from Floating Point Systems and CSPI and that 500 units have been shipped in the US since the AP400 was launched there 18 months ago by Analogic's US parent.

Analogic explains that the speed of the AP400 is achieved using a combination of pipeline and parallel features. It can be programmed in Fortran or assembly language on the host minicomputer and Analogic offers a library of routines covering functions like basic vector and array operations and fast fourier transforms.

Analogic says that existing uses for the AP400 include processing seismic, speech and vibration data while potential application areas include robotics, automatic test equipment and computer aided design and manufacturing.

# Dicoll system for Hull's flood plan

A COMPUTER-BASED data acquisition, storage and display system for Hull's anti-flood scheme is to be supplied by Dicoll Electronics, Basingstoke. The Dicoll system, based on a Digital Equipment LSI-11/2 processor, will be used with the main telemetry equipment which will monitor and compare incoming water levels with predicted flood levels.

Data gathered from four outstations will be available for analysis via VDUs and in the event of a flood threat a tidal surge barrier will be lowered across the River Hull.

## GA puts up prices

**GENERAL AUTOMATION has joined the army of minimakers raising their prices, with average across-the-board increases on hardware and software of 7% in the US. Underlining the dramatic impact of double digit inflation in the US, the increase is the first in the company's 12-year history.**

# Three bidders for BOC's ICL service

BOC DATASOLVE has lined up three serious prospective purchasers for its ICL 2900 VME/B service, which the bureau wants to sell because of the slow rate at which 2900 users are converting from DME to VME/B.

Conversion work has provided most of the VME/B service turnover which has grown from nothing to £1.2 million over the last three-and-a-half years. But the service only broke even last year.

BOC Datasolve is selling the complete VME/B operation including a five-megabyte 2972. Many of the 35 staff were originally from ICL's development centre at Bracknell. The operation is currently based at BOC's Sunbury-on-Thames bureau centre, and BOC Datasolve managing director Chris Wood said that the purchaser could continue to run the service from the Sunbury premises if required.

Wood pointed out that the interested parties consisted of a foreign company which was not in the bureau business at the moment, and two UK computer services firms.

Wood said that getting out of the VME/B business would enable BOC Datasolve management to be deployed on to improving the bureau's IBM based services which were growing at 35% a year.

One ICL user, the Leicester-based insurance company, Hogg Robinson, reverted to George 3 DME on its 2960 about a year ago because of its dissatisfaction with the performance of VME/B. Hogg Robinson was one of the first VME/B users in the country. The company has installed two Digital Equipment PDP-11/70 systems to handle online work, some of which could have been processed by the 2960 if the latter had still been running under MVE/B.

## NEWS IN BRIEF

### Three sign for maintenance

COMPUTER Field Maintenance has won contracts worth £100,000 a year with three firms to take over the maintenance of IBM-plug compatible equipment made by General Telephone and Electronics.

GTE pulled out of the UK market over two years ago, but left a field service team to maintain installed equipment which includes front end processors, VDUs and printers. The customers are British Steel, the Meteorological Office and stockbrokers Bache Halsey Stuart Shields. The contracts all run for three years.

### Naked Mini

THE Naked Mini family from Computer Automation has been extended at the top end with the NM4/95, a machine which provides features like a 2K cache with a 50 nanosecond access time and a memory management unit which enables up to eight megabytes to be addressed. Naked Minis are aimed primarily at the OEM market.

### 500 terminals

BARCLAYS Bank has placed an order with Burroughs for 500 B90 terminals. They account for the 500 B90 orders claimed by Burroughs when the B90 was announced (CW, January 17). The B90s will replace aging Burroughs TC500 and 3500 terminals at Barclays branches. Many branches have already been re-equipped with Burroughs B80 terminals.

### First sale

A MARKETING agreement between Safe Computing and Eurodata, ICL's System 10 dealer in Greece, has followed Safe's first sale there of its SaFeS production control package.

# Plessey's warfare simulator

A SYSTEM which models the complete engagement of aircraft, radar and weapon systems when the aircraft is within the range of selected fire control radar, is now nearly complete at Plessey Electronic Systems Research after four years of development.

The Electronic Warfare Engagement Simulator is to be used as a research tool by the Defensive Weapons Department of the Royal Aircraft Establishment at Farnborough. Its function is to aid development of electronic countermeasures, ECM, techniques.

Two unidentified computers and five microprocessors, likely to be micros, perform dedicated tasks such as creating the tracks of the attacking aircraft in three dimensions, and representing a radar cross-section of the aircraft.

# ICL 7700 snags 'ironed out'

DESPITE some problems with the terminal software, which have been reported by other users, Morgan Grenfell DP manager A. R. Gibson is "generally satisfied" with his three ICL 7700 word processors.

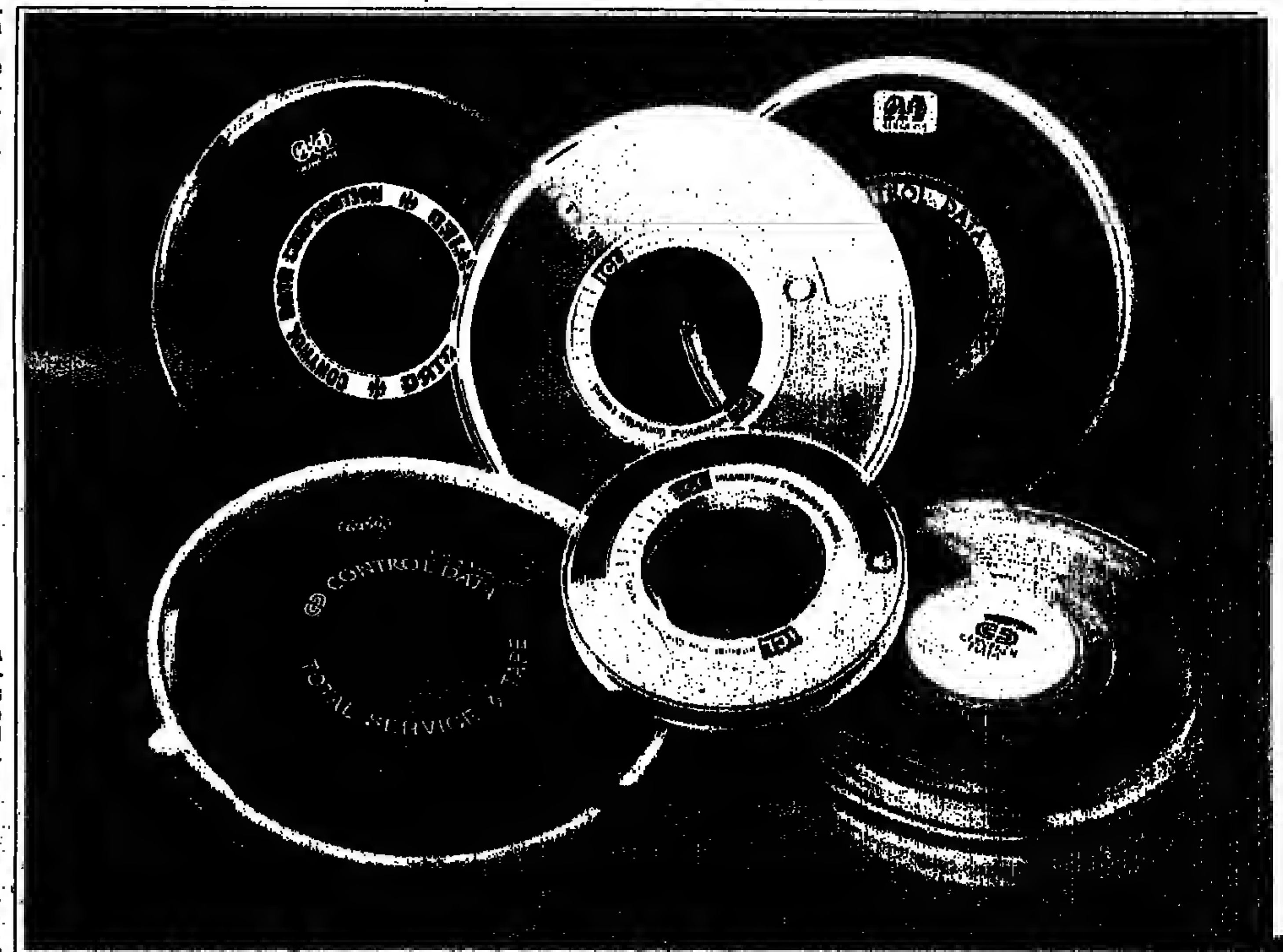
"We've just had a new release of the software which irons out some of the problems," he told Computer Weekly.

The bank is planning to use the Wordskil Manager mainframe package which turns the 7700 into a distributed office communications system and allows interaction between the word processors and mainframe files.

"We tried it out for the first time only yesterday because of problems with the Post Office connection. But when we made the link, the 7700 was straight through to Wordskil Manager. The girls are very pleased with the 7700s," he added.

IBM's equivalent of Wordskil Manager, DISOSS, Distributed Office Support System, which runs on a 370-type mainframe and is for use with the 3730 shared logic word processor, is set for September 1980 delivery.

The Document Transmission Facility, which allows electronic mail via a 370 host, will be available in May.

# Magnetic tape from Control Dataset.

Because your major investment must deserve the major supplier.

It's no surprise that Control Dataset is the U.K. computer industry's leading supplier of magnetic media.

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# A real time high level language for micros

## by Alec Fontaine and Alec Fitton

IN MANY engineering applications the microprocessor has already become an established feature and the growing demand has resulted in a large number of packaged micros coming on to the market. Good value as these may be they take away many options available to the user at chip and board level, particularly the possibility of building real time features into the system.

In addition, Basic, the language most commonly used, offers no hope of solving real time problems when a system comprises a number of independent tasks.

Using components and boards the system designer can apply a versatile software solution that would have previously required conventional analogue/digital circuitry.

Such systems are by their nature real time systems involving timing, counting, cyclic activity, monitoring and response to external events and stimuli.

In order to implement software on such systems, designers have gone back to writing code at machine or assembler level since structured programming languages with real time attributes are not available to any great extent.

This recourse to assembler and Basic on microprocessors instead of languages which encourage good software structure led to the despairing comment by Dijkstra that "micros have put software progress back by 20 years".

However, some modern structured languages, such as Coral, RTL/2 and PL/M, all having their origins in Algol 60 and 68, are being implemented on microprocessors.

These implementations vary from the interpretation of semi-compiled code which removes from the user all possibility of real time system programming, to the direct production of machine code (PL/M) which makes real time attributes awkward, but not impossible, to realise since "code" segments are not allowed.

No high level language can fully cater for the programming requirements associated with machine dependent areas such as I/O and interrupt structure, so assembler code level segments within high level language statements and some assembler-like directive facilities, for example to direct code loading to suit RAM and ROM configuration, are inevitable.

The software generation tools available to the microprocessor systems designer at chip or board level often take the form of "development systems" bought from the microprocessor manufacturer and dedicated to a particular device or family of devices. These systems cost from £3,000 to £12,000 depending on options and any change to another microprocessor carries serious financial and operational penalities.

Unlike hardware costs, software costs are rising and the ability to design software for microprocessors in a high level real time language even for small systems, is very desirable. A solution to this problem lies in combining the systems and applications programming capabilities of a structured real time high level language with a suitable generation system.

An example of a language designed to meet these needs is RTL/2. It originated within ICI in 1971 to a specification based on the successful proven features of many other languages and incorporating new features where no proven model existed.

It is therefore an engineered product, the original definition is unchanged and all implementations of RTL/2 compilers conform to one language specification. There are no sub-sets or super-sets of RTL/2, the language definition is invariant. It is also a British standard.

RTL/2 is a structured language which has features that allow a problem to be split up into components, the central elements being procedure bricks of read only code and data bricks of static data. The passing of variables from procedure to procedure and local transient variable storage is done via a last-in-first-out memory stack which facilitates re-entrancy and recursion.

Manipulation of any data type, including arrays, can be done very flexibly using explicit indirect addressing. RTL/2 avoids dynamic structures with their large housekeeping routine overheads. The form of the language encourages the programmer to think of his problem in a disciplined, structured way.

The language also addresses itself to the requirements of multi-tasking real time systems. The philosophy of modularity of code and data inherent in the PROCedure and DATA bricks is continued by provision of the brick type STACK and the variable type procedure whereby the writing of several independent tasks, sharing procedure bricks but each having its own STACK, may be done without recourse to mechanisms outside the language. See Figures 1 and 2.

A system may be split into several modules, perhaps a basic systems modules and an applications modules. Proc, data or stack bricks can be made accessible from any module and applications modules. PROC, DATA or STACK bricks can be made accessible from any module and one of the key safety features of the language is that each module can be separately compiled and inter-module linkage information at brick level produced.

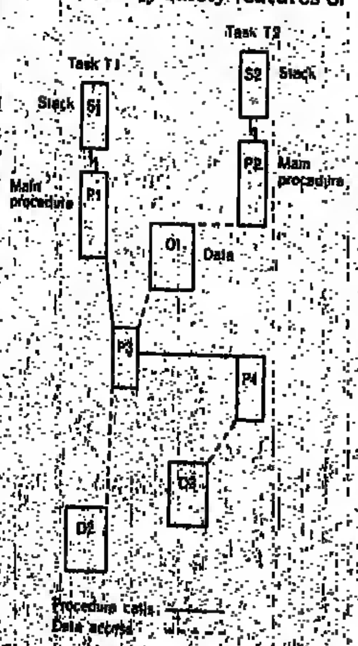



Figure 1. Inter-relationship of STACK, PROC and DATA bricks in a simple multi-tasking situation.

Fontaine

**Microprocessors are now an established feature of many engineering applications and there is a wide selection of packaged systems on the market. However, engineers often need to work from chip and board level and build in their own options. For such development work structured languages are now being used, among them RTL/2 which originated in ICI in 1971. Here Alec Fontaine and Alec Fitton, of ICI's Organics Division, who have been closely associated with the development of the language, outline its features and application micros.**

**After graduating in chemical physics, Fontaine taught physics before joining ICI to work on mass spectrometry. He has been working with systems for small computers and microprocessors for the past 11 years.**

**Fitton joined ICI Corporate Laboratory in 1974 after graduating in theoretical physics and has been involved at the centre of RTL/2 development. The last two years have been spent developing mini/micro based systems for laboratory applications.**

Fitton

A linker program can then check each cross reference and the declared brick structures thus trapping many potential errors at an early stage, which may otherwise go undetected right up to commissioning (and possibly beyond).

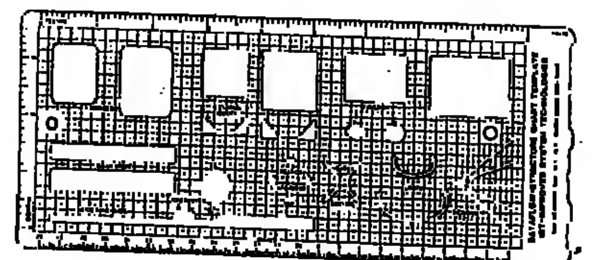
Structured programming forces constraints upon the programmer in order to enhance the integrity of the run time system. Real time systems are notoriously difficult to de-bug so RTL/2 does everything possible to trap errors at system generation and also provides the variable type LABEL, which allows very flexible dynamic system error recovery mechanisms.

RTL/2 compiler units consist of two main parts, an unchanging front end and a target machine dependent back end. Both units are written totally in RTL/2 and their composite, together with a suitable interface to the host operating system, can run as a utility on any medium sized minicomputer system.

The language is extensively used in the UK and Europe mostly for process control work but increasingly in the small plant and laboratory area.

The attributes of a micro-

● Turn to page 19

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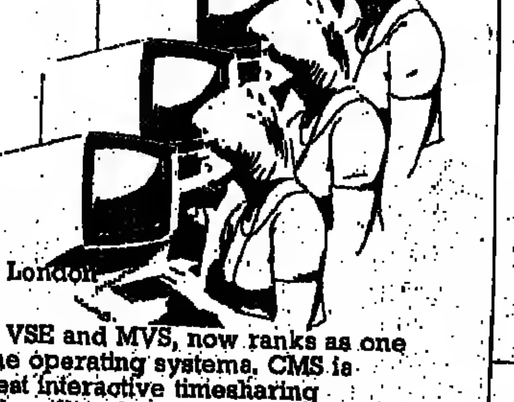

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# Bringing modern software into the micro sphere

● From page 18

processor support and generation system would be such that
(a) It can cater for a number of microprocessors.
(b) The software components can be written in a high level language.
(c) It would have as few target microprocessor dependent components as possible.
(d) It would give the system designer independence from microprocessor manufacturer's software — assemblers, linkers, loaders, operating systems etc.
(e) It would utilise a versatile, structured, high level, real time programming language whose definition is standard, free from 'enhancements', sub-sets or super-sets and modular.
(f) It would accept new compilers as "plug-in" components.
(g) It would be implementable on a wide range of service machines from mainframes down to modest mini systems.

The components of any such generation system are:
(a) Compiler(s);
(b) Assembler(s);
(c) Linker;
(d) Loader;
(e) Online PROM programmer hardware; and
(f) PROM programming control software.

A system has been implemented at ICI Organics Division which produces software for the Texas Instruments 16-bit micro processor family 9900/9980 on PROM directly from RTL/2-source text. See Figure 2.

In the ICI system the crucial component is the RTL/2 compiler and its philosophy.

In 1977, Software Sciences took up a contract from ICI to write an RTL/2 compiler back end for the TI 990 minicomputer. In common with most remits for compilers the goal was for the compilation product to be compatible with the facilities offered by the manufacturers operating system for the target machine, in this case the TI system DX 10.

Software Sciences took the crucial decision to incorporate an assembler phase within the compiler back end, thus preserving the programming option and RTL/2 specification for the inclusion of CODE sections within RTL/2 code, while removing the requirement for a separate assembler. The compiler/assembler output does however include a pseudo-assembly listing.

The compiler-assembler output from a successful compilation of an RTL/2 module consists of labelled (tagged) alphanumeric and binary codes in accordance with TI DX/10 assembler conventions. See Figure 3.

The form of this output from the compiler-assembler is in principle independent of the target microprocessor or computer; the meaning of the labels intended to aid module linking derive from concepts such as EXTERNAL(s) which in RTL/2 have been formalised into the language.

Thus there are tags to refer to brick names referenced within the module but external to it and tags to refer to bricks defined in the module which the programmer requires to be accessible from outside the module.

Since use of the RTL/2-TI compiler-assembler forces post assembly linking and reference checking, the pseudo-load operation is incorporated in the same piece of software as the linker.

This is a small RTL/2 program which scans the file(s) containing the compiler-assembler outputs and sets executable absolute binary code into a file which is a memory image of the target system.

The third and last software component of the generation system is also a small RTL/2 program which converses with a PROM programmer along a serial line from the host machine.

The particular PROM programming equipment used in this case is that manufactured by ITT. This kit also incorporates simple online de-bugging aids, but any PROM programmer with serial line access could be used.

This component of the system may, of course, vary in form depending on the real microprocessor loading operation to be performed. Board-based microprocessor systems, which use (P)ROM and read/write semiconductor memory, seldom have facilities for program loading in the traditional sense (from paper tape or cassette), and their code must usually be non-volatile anyway.

If this is so then as well as the normal system start up code for setting up STACK(S) and opening the interrupts which drive such systems the programmer must also initialise any read/write based data that require it.

Experience has shown that with RTL/2 this need only involve the length vectors of read/write arrays.

These three RTL/2 software utilities comprise a well integrated production unit for providing executable binary directly from RTL/2 (4K bytes in 10 minutes including PROM programming and full pseudo-assembly listing).

It is not difficult to envisage a standard, machine-independent form of labelled compiler-assembler output. The Software Sciences RTL/2 TI 990 product has most of the required qualities but the labelling philosophy could be extended.

If some agreement about standardising the form and content could be reached with compiler writers then the only target microprocessor/computer dependent part of the generation system is the RTL/2 compiler back-end. A new microprocessor family means a new compiler back-end and that is all.

Any computer that can support an RTL/2 compiler will necessarily contain the elements to support and run other RTL/2 programs.

The ICI Organics TI/RTL/2 generation is done on a Digital Equipment PDP 11/34 with disc on which is mounted a standard interactive multi-user RTL/2 based operating system.

This system is itself a special case of RTL/2 multi-tasking (MTS) philosophy in that it is a utility oriented MTS system. The three programs described are simply plugged in as utilities and may be run separately or under the control of a command string which engages each phase in turn. These correspond to JCL steps on a mainframe.

*Systems Programming Ltd has the main marketing responsibility for RTL/2-MTS operating systems and support and can provide information on setting up such systems.

This generation system has enabled us to extend the ICI systems philosophy, which relies on RTL/2, into the areas where microprocessors are used. The eight systems produced within the last year are all single module systems which have been aimed at three different TI based microprocessor boards.

Applications vary from simple sequence control through the handling of serial communications lines to the control of complex test devices.

Until the compiler-assembler product from Software Sciences became available the requirements of a generation system to produce code from a high level language, for a target machine too small or unable to support its own production software, seem to have been neglected by software houses. There seems always to have been the assumption of the availability of assemblers, linkers and so on, even with cross compilers.

Structured languages have reduced the use of assembler code to machine dependent areas and possibly sometimes for speed. The development described in this paper brings modern software into the microprocessor sphere by combining a proven high level language with a well integrated generation system which can quickly and easily accommodate any new microprocessor.

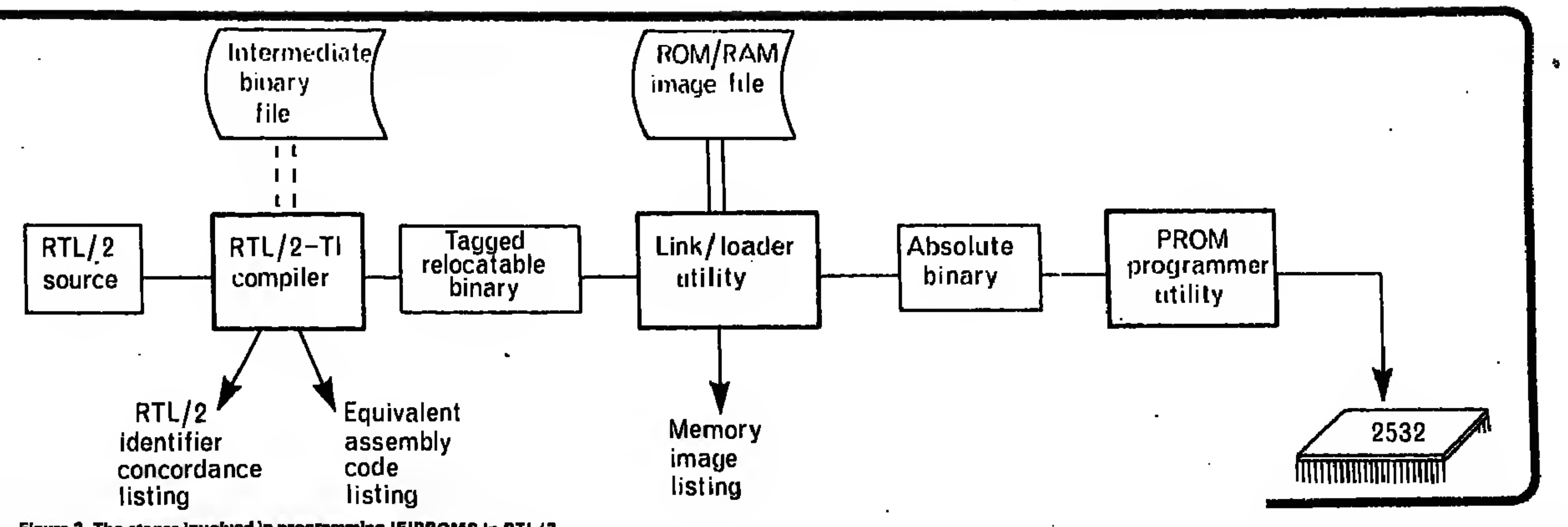


Figure 2. The stages involved in programming (E)PROMS in RTL/2.

```
0019EMCSCAN   A0000A0000B00CGA00CBA00CBBE27CB2CA0B02C0CBCECBB02C17F1CBF
C00E0BC2C7B022BB00C0BC0C0BC0A04B000C0B0B0000BCAFBB00CCB0004B020B7F1CEF
B0000BC02BB000CB1309BC02BB0004B1G0BCEFBB04FABCEA0C00CBB0BA00000C7F17CF
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C00DBBCGC9B0004B02B3B001FB1B04B020BC01CCBB05ABB0004B10A17F3ESF
3018BRRERR  3018ADELAY  3015ARFADAN1010 4MEDUIF3017CTIMEDA3019GDATABA7EFBDF
50000SCANST500CASCAN   7FABAC
:      MCSCAN
```

**Hex coded "tagged" binary output from the TI-RTL/2 compiler. Each tag is a single Hex character and is followed by one or two fields depending on the value. Note that a 16-bit address, for example, therefore appears as four Hex digits. Some examples of the tags used by the TI compiler are:**

| Tag | Field 1 | Field 2 | Meaning |
|---|---|---|---|
| 0 | Length of relocatable code | 8 character program identifier | Program start |
| 3 | Location of last appearance of symbol | 6 character brick name | EXT ref last used in relocatable code |
| 5 | Location | 6 character brick name | Relocatable ENTry address |
| A | Load address | none | Relocatable load address |
| B | Data | none | Absolute data |
| C | Data | none | Relocatable data |

**Thus on the penultimate line of the compiler output there are two "5" tags showing that the relocable ENTry addresses for STACK, SCANSTK and PROCSCAN are Hex 0000 and Hex 00CA respectively.**


REFERENCES
RTL/2 Design Philosophy, J. O. P. Barnes; Heyden and Son, 1976.
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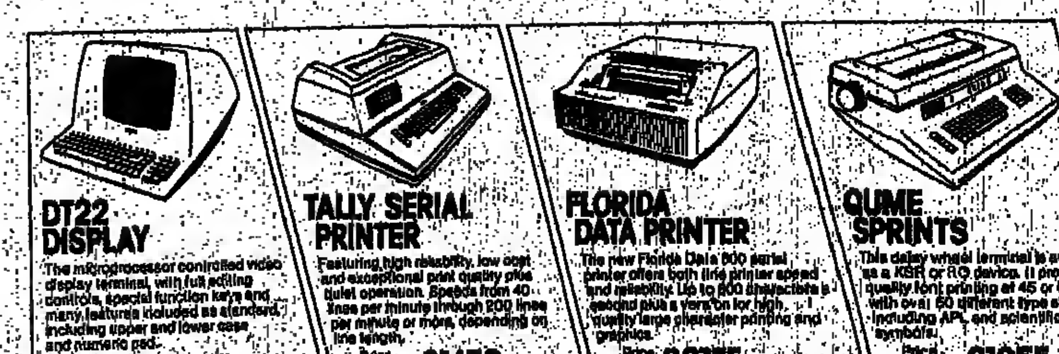

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# COMMUNICATION NEWS

## Americans will have to buy their own phones

THE US Federal Communications Commission, has ruled that by 1982 all subscriber telephone equipment will have to be bought rather than rented, and American Telephone and Telegraph may enter the data processing market.

This will end many legal wrangles about whether electronic mail and packet switching are communications or whether they constitute data processing services which AT&T was forbidden from offering under the 1956 Consent Decree in exchange for the privilege of operating in a regulated market for telecommunications.

## Discovering datacomms

FINDING ignorance of basic principles of data communications among would-be technicians led Brian Warrington to prepare a training guide for newcomers.

After becoming managing director of the UK subsidiary of terminal and acoustic modem maker Anderson Jacobson, he looked into the cheapest way of printing about 1,000 copies for in-company use, and his public relations agents suggested publishing it as a book.

The result is Discover Data Communications, published by Northwood Books in London at £4.50, which after mis-spelling Anderson Jacobson in the acknowledgments settles down to a simple introduction to some of the equipment and methods commonly used in data communications in an analogue environment.

It includes a glossary of terms and a review of the CCITT V-series recommendations for modem interfaces to terminal equipment and telephone lines.

# Enhancements to Tymnet message switch service

A CHOICE of word processing facilities for input terminals, plans for direct communications from Ascii terminals to facsimile terminals, and fax-to-fax message switching by the winter, are enhancements announced by Tymnet for its OnTyme message switching service in the US.

Some of the word processing facilities are now available on the updated service, called OnTyme II, and further commands are to be added in coming months. The message switching services are not available in Europe because the international record carriers — ITT, RCA and WUI — are objecting to the Federal Communications Commission giving its approval. They fear big losses of telex traffic.

The facsimile conversion enhancements will be implemented using the AFT translator device made by Compression Labs of Cupertino, California.

They mean that it will be possible to send messages without knowing what kind of facsimile receiver or data terminal the recipient has.

Software for the service is written in Pascal and runs under the Isis operating system in the Tymnet Engine node processors. It supports a wide variety of terminals from Telex to IBM 3270 and devices compatible with them as well as most Ascii terminals.

Facsimile devices supported include CCITT Group 1 and Group 2 types, which receive an A4 page in six and three minutes respectively. Tymnet estimates that 95% of the 200,000 facsimile transceivers in the US will be reachable via its service.

Features of the service include least cost routeing, automatic dial-out to an auto-answer terminal, or "mailbox" storage for dial-in collection and multiple delivery to a pre-defined group or a list of recipients.

From September the option of postal delivery called Tyme-Gram is to be added to the message service, aiming to enable single A4 page messages to be delivered quickly and cheaply to people not accessible directly from Tymnet. Tariffs are planned at one dollar per message sent, reducing to 30 cents each when large numbers of messages are sent in a batch. They are to be distributed from 30 metropolitan post offices and will be expected to reach their destinations the day after sending in 90 per cent of cases.

● Telenet, now a subsidiary of General Telephone and Electronics, has also announced a message switching service called Telemail to go into service on July 14. It aims to reach a variety of desk top and portable terminals, which it estimates total 1.5 million in use and potentially accessible.

It has asked the Federal Communications Commission to approve tariffs of 22 cents a minute during business hours and five cents a minute outside them, with volume discounts of up to 50%.

## Arbat for Natwest

ARBAT has sold an Intelex-II message switching system to the National Westminster Bank. The system, based on a Digital Equipment PDP-11/34 processor, will join a variety of other communications equipment in the bank's new tower block headquarters in the City of London.

## Speaking fax machine

THE Voice Guide Panafax 7700 facsimile transceiver from Matsushita Graphic Communication Systems uses standard chips to produce synthesised speech messages to guide the user through operation and fault recovery procedures. It is on sale in the US at $7,200 and operates in nine modes including the CCITT Group 2 standard for transmission of an A4 page in three minutes.

Transmission in six minutes gives higher resolution and the fastest speed is 40 seconds for an A4 page.

## US firm gets licence

BRITISH Telecom (formerly the Post Office) has sold a licence for its double crucible method of drawing optical fibre for communications cables to Galileo Electro Optics in the US. This company has been involved in optical fibre products since 1959 and claims to be the world's largest producer of optical fibre cables, components and systems.

The licence forms part of a technology exchange agreement between the two organisations.

The agreement also covers production of the glass raw materials and well-tested cable construction techniques.

Galileo rates the double crucible process developed by British Telecom the most versatile yet and the only one by which low loss fibres over 25 kilometres long can be produced without splicing.

● British Telecom has run the world's first trial of a submarine optical fibre cable in a nine kilometre loop in Loch Fyne, Argyll. Laying costs can be greatly reduced with such systems because optical fibre cables are much smaller and repeater spacings average 10 kilometres against eight in analogue copper cable systems.

## Yearbook omits Prestel

PRESTEL is a major omission from the 1980 edition of the Eurodata Foundation Yearbook, which gives detailed information on the data communications services provided by the 18 European PTTs. Facsimile also appears not to have been considered a data communications service in the UK.

However, £75 buys 484 pages of information — on tariffs and technical details of the services and the management structure of the PTTs themselves, which is otherwise rather difficult to come by.

The Eurodata Foundation has moved to Broad Street House, 55 Old Broad Street, London EC2M 1RX.

Its main publication, the Eurodata 79 Study, has been completed by Logica, the prime contractor, and is due out in a few weeks.

## Timeplex seeks patents

TIMEPLEX has applied for patents on the multiprocessing architecture used in its Microplexer Series II statistical multiplexer.

Timeplex president Ed Botwinick believes the scheme his company has developed will have real time multiprocessing applications besides multiplexing and could be as important to the company as the Unibus has been to DEC.

The patent applications relate to the structure of the bus around which systems can be designed and the methods used to allocate tasks and handle highspeed data transfers between processors.

## Canadian $56m project

THE government of the Province of Saskatchewan in Canada has begun a four-year, $56 million project to use optical fibres to carry integrated voice, data and video signals through a 3,200 kilometre broadband network.

Saskatchewan Telecommunications, the telephone company owned by the Province, has placed the first order worth £22 million, for optical fibre cable and transmission equipment, with Northern Telecom, the Canadian telecommunications manufacturing company.

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# COMPANY NEWS

# Datapoint snaps up troubled Inforex

THE rapidly expanding manufacturer of distributed processing systems, Datapoint, is acquiring troubled key-to-disc systems supplier Inforex in order to strengthen the field service operations for Datapoint kit in the US and some key areas of Europe.

An agreement in principle between the two firms was reached about two months ago including an option for Datapoint to buy the Inforex subsidiaries in Europe (CW, April 17).

Datapoint executive vice-president of corporate development, Ed Gistaro, told Computer Weekly Datapoint was particularly interested in the Inforex service organisation in Europe because Datapoint's agreement with TRW, under which the huge engineering conglomerate is the master distributor for Datapoint kit outside the US, was due to expire in 1983.

Gistaro said that the large Inforex marketing and service force in West Germany could be particularly valuable because the existing distributor there, Gier Electronics, is 100% owned by TRW. So Datapoint may need a completely new West German operation in 1983.

At the same time Gistaro emphasised that a lot of existing distributors in individual countries that dealt with TRW at the moment would be retained by Datapoint after 1983. Notable among these is the UK distributor Ventek, in which TRW owns a 40% share, the majority being held by the Canadian government organisation, Venturetek. Ventek is far bigger than the Inforex subsidiary in the UK.

Gistaro pointed out that Inforex was also being acquired for its big customer base of large and prestigious companies. Inforex is best known as a supplier of key-to-disc data entry systems to big mainframe users.

On the question of what Datapoint would do with the Inforex product line, Gistaro said that no decision had been made yet on whether to continue shipping the two most up-to-date Inforex products, the 5000 file management system and the 7000 clustered intelligent terminal with interactive Cobol.

Gistaro suggested that the Inforex marketing force in Europe might continue selling the 7000 for the time being because of the bar on them selling Datapoint's own kit on this side of the Atlantic until 1983.

But he pointed out that the large existing base of Inforex kit in Europe was already generating enough revenue to cover the cost of retaining the Inforex workforce in Europe up to 1983.

Asked to comment on the reasons for Inforex's troubles, Gistaro said that the Inforex product line was rapidly becoming obsolete while the new 7000 system had not got off the ground yet.

## $500 million sales by 1983 is aim

DATAPOINT is keen to take over control of its international marketing in 1983 and it informed TRW officially in March of its decision not to renew the master distributor agreement.

The deal with TRW was made at a time when Datapoint lacked the financial resources to set up an international marketing operation. In contrast TRW's mighty resources included 30,000 employees in Western Europe alone.

Datapoint is now a more substantial organisation, having chalked up net profits of more than $28 million on revenues of $232 million in its 1979 financial year ended July 31. Revenues for the current year are expected to reach $300 million and the aim is to exceed the $500 million mark by 1983.

The Datapoint man in charge of international marketing, Herb Hensley, pointed out that Datapoint was selling its products to TRW at about half price so that business done by TRW's distributors outside the US was providing Datapoint with only 21% of its revenues even though it accounted for 40% of all deliveries.

Europe provided no maintenance revenues for Datapoint and no lease revenues while more than half the kit installed in the US by Datapoint itself was generating lease revenues.

The rate of growth of Datapoint business outside the US is an impressive 33%, but that is still slower than the domestic growth rate. TRW has fewer incentives than Datapoint to invest in training and support and to take marketing risks that might increase its market share.

Datapoint's ambitious plans include taking a major share of the office systems market with its Integrated Electronic Office (CW, January 10).

## Pets breed success

NET profits of $3,690,000 for the second quarter ended December 31, reported by Commodore Business Machines, have more than doubled compared with $1,340,000 for the same period in the previous year. Turnover of $31,516,000 was also more than double the $15,677,000 recorded in the previous year.

These figures are attributed by Jack Tramiel, president of CBM, to the performance of the Pet computer systems division. In the UK sales of the Pet have exceeded 18,000, and CBM claims to have 50% of the UK market for microcomputer systems (CW, January 3).

## Profits up 52%

NET profits for the past financial year are reported by General Instrument to have increased 52.4% from $32,524,748 the year before to $40,569,532. Turnover for the same period increased 30.4% from $550,648,002 to $718,103,819.

## CII-HB hit by shortages

HIT unexpectedly hard by component shortages, CII-Honeywell Bull has reported poor first quarter figures. The problems are expected to continue into the second quarter. Sales plummeted 25.4% to FF 290.7 million, £30 million, compared with the first quarter of 1979, while rentals and services rose a modest 9.8% to FF 624.4 million, £64.5 million, giving the company a total outturn for the quarter of FF 915.1 million, £94.5 million, down 4%.

This contrasts dramatically with ICL's first quarter 1980, which brought turnover in excess of £170 million, an increase of over 20%.

## Merger shares allocated

UNDER the definitive agreement on the merger between Storage Technology and Amdahl, the share allocation has been revised so that Amdahl holders get 1.25 shares in the merged company and Storage Technology holders get one share.

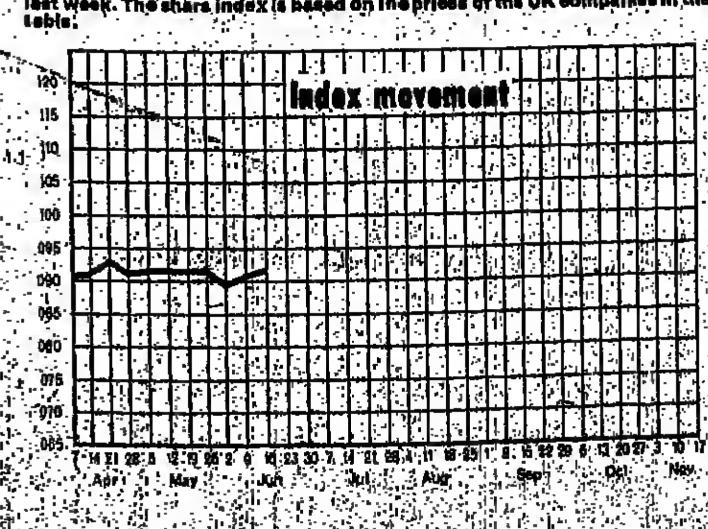
The revised terms are slightly less favourable to Amdahl holders since they end up with about 46% rather than 47% of the merged company. Fujitsu exercised share options and increased its Amdahl stake from 27.9% to 33.7%. This will give it about 15% of the new company.

## CW SHARES TABLE

Date: 13/6/80 Index: 82.81 Change: +7.06

| London Stock Exchange: 1980 High (pence) | Low | Stock | Price | C'nge | New York Stock Exchange: 1980 High ($) | Low | Stock | Price | C'nge |
|---|---|---|---|---|---|---|---|---|---|
| 368 | 230 | A Comp Tech (25p) | 368 | +63 | 18⅞ | 14¼ | AM International | 16½ | −¾ |
| 43 | 28 | B Bov Kent (25p) | 30 | − | 17⅞ | 17¾ | Ampex | 18½ | −½ |
| £37 | £28½ | Burroughs ($5) | £29½ | +£1¼ | 65⅛ | 33¼ | Automatic Data Proc | 39⅝ | −⅛ |
| 78 | 43 | Chloride (25p) | 43 | −4 | 84 | 63⅝ | Burroughs | 68¼ | −1 |
| 120 | 84 | Chubb (10p) | 97 | +3 | 23¾ | 16⅜ | Computer Sciences | 22 | +1½ |
| 100 | 84 | Cole (R.H.) (25p) | 84 | − | 60¼ | 45 | Control Data | 55⅝ | +¼ |
| 700 | 540 | De La Rue (25p) | 700 | +60 | 78⅛ | 56½ | Digital Equipment | 67½ | +½ |
| 180 | 145 | Extel (25p) | 161 | +8 | 38⅝ | 25⅜ | Harris | 36¼ | +⅛ |
| 560 | 407 | Ferranti (50p) | 550 | +45 | 69¾ | 53¼ | Hewlett-Packard | 64 | +⅛ |
| 378 | 325 | GEC (25p) | 371 | +13 | 87⅝ | 66⅛ | Honeywell | 80½ | +2⅜ |
| £43¼ | £30⅝ | Honeywell ($1.50) | £34 | +£⅜ | 74½ | 55¼ | Intel | 57 | −½ |
| £31 | £22 | IBM ($1.25) | £24⅝ | +£⅜ | 70½ | 51⅛ | IBM | 58⅞ | +1⅛ |
| 147 | 115 | ICL (25p) | 147 | +10 | 18⅞ | 11½ | Memorex | 14⅜ | − |
| 74 | 64 | Kalamazoo (10p) | 71 | +4 | 61⅛ | 42⅛ | Motorola | 49½ | +1⅞ |
| 240 | 203 | Kode Inter (25p) | 226 | +8 | 28 | 17⅛ | National Semi | 23¼ | +⅞ |
| £28¾ | £20¼ | Motorola ($3) | £20¾ | −£⅛ | 78⅜ | 55¼ | NCR | 60¼ | −⅜ |
| 270 | 138 | Muirhead (25p) | 138 | − | 45 | 37 | Perkin-Elmer | 45⅝ | +1⅛ |
| £111 | £76 | NCR 4% 93/98 | £83½ | −£½ | 61⅛ | 53⅞ | Rockwell Inter | 55½ | −1⅛ |
| £162½ | £125 | Perkin-Elmer 4% | £149 | +£5 | 118⅝ | 85 | Schlumberger | 118 | +2 |
| 470 | 376 | Philips Lamp (Fl 10) | 386 | −8 | 57⅛ | 42¾ | Sperry Corp | 46⅞ | −½ |
| 183 | 108 | Plessey (50p) | 183 | +8 | | | Storage Tech | 14⅞ | |
| 264 | 180 | Racal Elect (25p) | 264 | +12 | 43¾ | 28⅞ | Tandy | 43⅜ | +2¾ |
| 84 | 65 | Rediffusion (25p) | 71 | − | 63½ | 43⅛ | Tektronix | 48⅝ | +⅜ |
| £27 | £20⅞ | Rockwell ($1) | £23⅞ | +£⅛ | 104 | 66⅛ | Texas Instruments | 94⅛ | +1⅛ |
| £56⅛ | £40⅞ | Schlumberger ($1) | £50½ | +£1⅛ | 47 | 36 | TRW | 40 | +⅛ |
| £26⅛ | £19¼ | Sperry Corp ($0.50) | £20⅞ | −£¼ | 8½ | 5⅜ | Wyly | 8 | +⅛ |
| £21 | £16½ | TRW Inc ($1.25) | £17 | − | 65½ | 50⅛ | Xerox | 58⅛ | −1⅛ |
| 324 | 287 | Thorn-EMI (25p) | 287 | +14 | | | | | |
| £26¼ | £21⅛ | Xerox ($1) | £24¼ | +£⅛ | | | | | |

The table shows the closing prices in London and New York at the end of last week. The shares index is based on the prices of the UK companies in the table.





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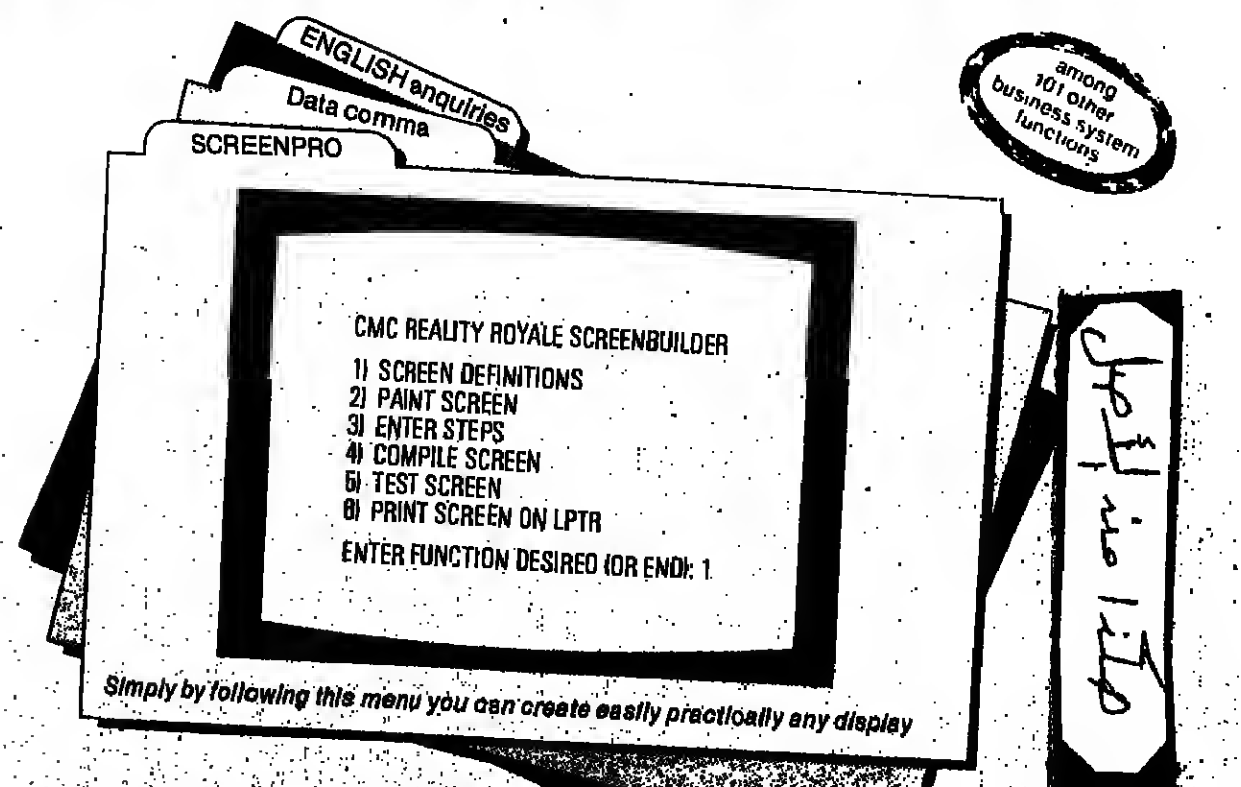


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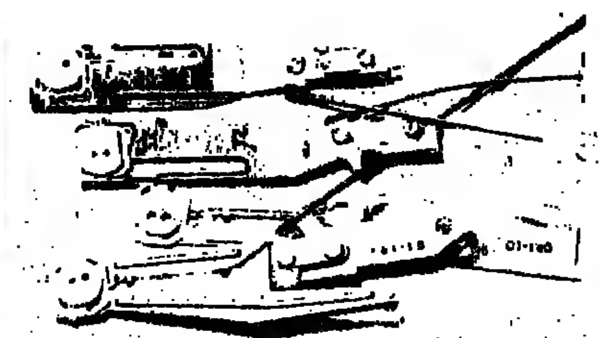

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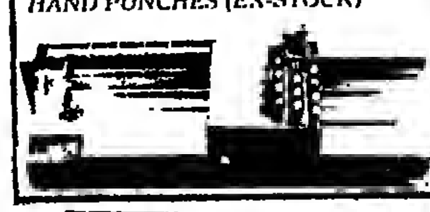

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ADVANCED FILE DESIGN—Part 10

by Owen Hanson and Norman Revell

# File structures for database systems

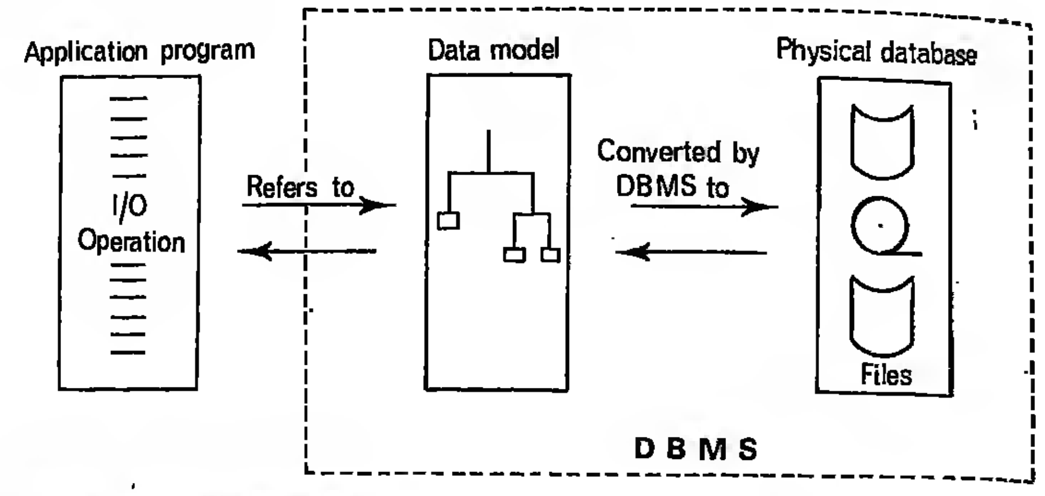


Diagram 1: The database environment.

AS we have seen in earlier works, indexed sequential files provide a compromise between sequential files with their capability for efficient batch processing and direct files and their more immediate response.

The fact that standard software is available means that there is less design effort required by the user than for a direct file where the user has to choose an algorithm, loading method, overflow handling routine etc. It is no surprise therefore that indexed sequential files are widely available on all types of machine from the microcomputer to the large mainframe.

Since indexed sequential files were first introduced the DP environment has changed quite considerably. Perhaps the two most significant changes that affect file organisation have been the move towards online systems and the database approach.

Online systems have produced a need for quick response to queries and a high measure of security and integrity, whereas the database approach has produced a requirement for the facility to access data records in many different ways depending on the application. It is worth noting that these two developments do not necessarily go hand in hand and that it is possible to have a database system that isn't online or vice versa.

In Part 10 we shall examine some of the concepts of database systems as they affect the file designer and in Part 11 some specific database management systems will be studied.

### The database approach

With the types of file organisation discussed so far we have seen how the design of a file or set of files can be optimised to suit the application. With the database approach, however, files can be accessed by several different applications — in fact the individual applications can be viewed as data channels through which data is added to or retrieved from the database.

The database itself may be a single file or a set of files, the important fact being that the database can be accessed by different programs in different ways. For example a personnel file normally accessed via a record key of payroll number for the production of payslips and similar documents, may need to be accessed via employee skill codes for production planning purposes.

The programs accessing the database may be regular production programs such as payroll management statistics, or may be of an ad hoc nature and run only once, especially if high level query facilities are provided. It is thus not relevant to optimise the database for any specific single application.

### Logical and physical database

The logical and physical concepts were first introduced to cover the case of record blocking[1] where the words are used to represent application program-oriented and device-oriented records respectively.

The logical concept has been extended further in database to cover the relationships between data fields or elements as well as records. Once the data fields of a database have been determined a logical data model of the database can be constructed representing the application-oriented view of the database.

The physical database is concerned with the actual storage of data on the available peripheral devices. The mapping of the logical database on to the physical database is normally accomplished by a set of routines known as the database management system (DBMS). Application programs are completely removed from the physical database and can only gain access to it via the logical database.

The I/O operations in application programs which access the database files are special database I/O instructions which operate on a logical database; the DBMS then translates these into physical I/O operations, (see Diagram 1).

The objective of this approach is to keep applications independent of physical data storage so that either can be changed with minimal disturbance to the other, at least in theory. This concept is sometimes referred to as logical data independence.

At present there are three generally recognised data models, namely the hierarchical, network and relational. In the hierarchical model (Diagram 2) data fields and records are related by a parent-child relationship (as illustrated in the diagram by cars and their engines). It is worth noting that the hierarchy can be deeper than the simple two level one in this illustration.

The network model permits a record to belong to a number of parents thus permitting a more economic logical structure. Diagram 3 illustrates this for the same data used in the previous example.

In the Codasyl database model this structure is built using the set concept where a data field may be the owner of a set comprising data fields which are members of that set, though certain restrictions on set membership and ownership further limit the structures that can be built.

The relational data model employs tables of data elements known as relations stored in third or fourth normal form.[2]

### DBMS selection

As far as the DBMS is concerned therefore, we have the situation that there are a variety of data models which have to be mapped on to available file storage peripherals and file organisation techniques, preserving as far as possible the ideal of logical data independence.

Once a data model has been selected, then a choice of the DBMSs supporting that model can be made in such a way as to optimise the performance of the physical database for a given environment.

It is here that there is the first opportunity for optimisation, since the database can only be constructed using the physical file organisations supported by DBMSs.

For example if an organisation has large volumes of sequential batch processing and relatively few query-type applications, then choice of a DBMS based on inverted random files with multiple indices is unlikely ever to achieve the same performance as a DBMS using indexed sequential files, however well the former was optimised.

Once all functional requirements have been met therefore, a DBMS should be chosen which is most suited to its operational environment. The larger DBMSs normally offer scope for matching the database to any particular environment by giving a choice of physical file organisations covering the whole spectrum from pure query to large batch-type applications. Smaller systems such as those for mini- and microcomputers do not generally offer such a choice.

When a database has been set up, the individual files may be optimised by the techniques described in earlier parts that are appropriate to those file organisations.

It is unlikely that the overall hardware performance in a database environment would equal the performance of having separate applications each carefully optimised (as early DBMS users found to their cost) because of the overheads needed to provide the flexibility of data access. Indeed, hardware performance is seldom given as a reason for the adoption of a database approach.

A difficulty in optimising the performance of a database system lies in knowing precisely what is happening to the database at any one time, especially in an online environment.

If a log of transactions is kept, an analysis of the transactions may help to optimise the database files by identification of bottlenecks or other snags.

This approach would be effective in situations where routine applications predominate rather than those when query-type applications form a significant part of the workload, since this method relies on historic data.

It is also possible to use hardware and software probes for this same purpose. Also, most DBMSs provide statistics on reorganisation which may be used in a similar way. A database system should ideally be self-optimising, and possibly a new generation of DBMSs using advanced storage technology will achieve this in a way that is completely transparent and automatic.

In Part 11 we shall examine further the physical file organisations for database systems and consider some specific DBMS.

REFERENCES

1. Basic File Design, see details of this publication on this page.
2. Relational Databases. Computer Weekly series, October 26, 1978 to January 4, 1979.

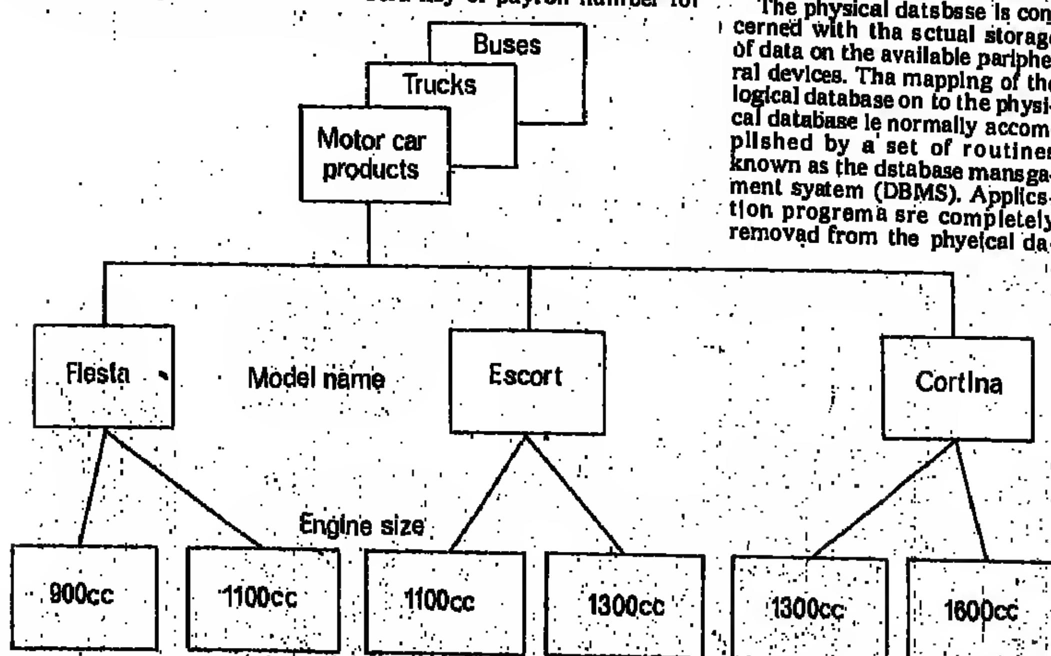


Diagram 2: A simple hierarchical database.

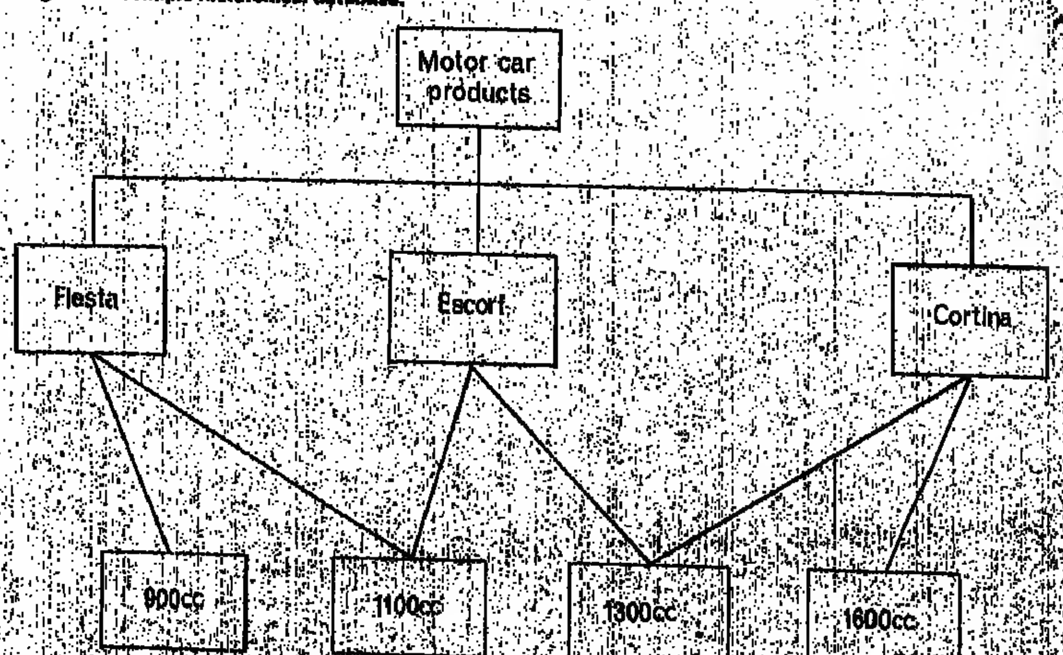


Diagram 3: Example of a network database.

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(1572)

# SYSTEMS PROGRAMMERS

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With a degree in Maths, Statistics, Chemistry, Electronics, Chemical or Mechanical Engineering or an associated discipline, you must be able to appreciate the scientific and technical problems encountered in our research – logically thinking them through to provide cost-effective computer solutions.

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Box number replies should be addressed to:

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London SE1 9LU

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## Software Consultants

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A new, recently formed software consultancy has opportunities for two d.p. professionals to join a design team which is currently carrying out design studies for a major mini computer manufacturer.

The areas in which expertise is required are:-

**Database Software** – Ideally, candidates should have experience of working with the internals of one of the major CODASYL dbms's. However, a System Programmer who has a clear idea of database concepts and who is easily adaptable may well be acceptable.

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These are "ground-floor" opportunities in the truest sense of the phrase. Phone now for more details. **Contact: Andy Wright**

## Real Time Programmers/ Designers

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Our client is one of the leading European systems houses with a history of consistent successful growth. Projects are developed in-house and on site on a variety of minis including DEC, DG, Ferranti, GEC and Burroughs systems. The sophistication of the type of real-time work carried out often involves the design of specialised operating software, multi-processor networks and communications systems. Candidates should preferably be graduates and have had at least two years experience of two or more of the following:- CORAL, PTW/2, COBOL, BASIC or ASSEMBLER. Ideal opportunity to contribute to major developments in the real-time systems world. **Contact: Margaret Stevens**

## Analyst/Programmer

**Surrey/Sussex Border** **c.£8,000**

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A minimum of 2 years programming and 1 year's analysis experience, from either environment would be considered. Good communicative skills are essential, and the ability to control staff would be an advantage.

Career prospects are excellent, progression to a Project Leader role would be offered to the successful candidate in the immediate future. **Contact: Janet Chilvers**

## COBOL Programmers and Senior Programmers

**Gloucs.** **£6,000 – £8,000**

A number of positions are available for programmers with from 1 to 4 years COBOL experience to join our client's new team, developing and redesigning their manufacturing and reporting systems on a new HP3000.

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**Berkshire** **up to £7,500**

A small, but rapidly expanding, systems house who specialise in real-time projects would like to recruit several programmers to work on the development of new systems. Candidates should have a nominal three years experience in real-time mini or microcomputer development using languages such as FORTRAN, BCPL, etc. A knowledge of small system software (device drivers, operating systems, etc.) would be an advantage.

Since there are several opportunities, staff with more than three years experience would be considered as would a junior. **Contact: Jim Baker**

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Technical Support Specialists and Systems Designers are their current requirement, but their German and Swiss branches will also need Senior Consultants in the very near future.

You will have had solid IBM experience in some, or all, of the following: DOS, DOS/VS, OS/MVS (especially if gained in a manufacturing or software house environment) will be of special interest. Also TP experience — CICS, IMS, Total or Adabas advantageous and you should be conversant with at least one European language.

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| Programmers and Systems Analysts required by Defence-orientated Systems House based in West Surrey. Your experience should be in real-time applications such as radar, image-processing, weapons systems, etc., and your languages will probably include Assembler and CORAL 66. Some positions based at the Company's offices in Southern Germany. | Systems Software Programmers with 2 or more years' experience in the message switching field required for an advanced telecomms system currently being developed in London, in parallel with a U.S. project. You will be involved in initial development work, and liaison with the U.S., followed by worldwide implementation of the systems. |
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# MIDLANDS APPOINTMENTS

# A wide range of jobs and good financial rewards

**The Midlands is second only to London for the number of installations and people employed in DP in Britain.**

**In this feature DAVID WADE, a director of the Birmingham based firm Specialist Computer Recruitment, gives his reasons why the Midlands is worth more than a cursory glance when considering changing job.**

THE Midlands must rate as one of the most important DP centres in the UK. Although not as intensive as London, in terms of the number of installations, it should not be regarded as a technological "back water." The range and types of installations in the Midlands are just as wide as the products produced. Birmingham itself has often been referred to as the "city with a 1,000 trades" ranging from cars to jewellary.

Perhaps one of the most interesting features of the Midlands is the wide range of sizes and types of companies operating in the region, offering DP professionals the opportunity of involvement in a wide spectrum of applications ranging from commercial, through manufacturing and distribution, to the scientific and financial modelling areas.

In addition to the wide range of firms and applications, most computer manufacturers are represented in the Midlands, ranging from large number crunchers with mass storage devices through a comprehensive selection of minis and micros.

A number of firms have head offices based in the Midlands and make extensive use of communications equipment and distributed processing, thereby offering tremendous scope for the DP professional.

It is worthy of note that an increasing number of London-based organisations are in the process of or are actively considering moving head office operations to the Midlands to take advantage of the more reasonably priced business premises and better living conditions for their employees.

In addition to user installations, most mainframe and minicomputer manufacturers have sales and support operations located in the Midlands and two large mainframe manufacturers have recently moved their UK training centres to Birmingham.

The area also has a number of successful software houses and bureaux, once again giving added scope to the data processing professionals wishing to broaden their experience.

The Press seems particularly gloomy these days, announcing redundancies in the majority of manufacturing areas, and while the Midlands is first and foremost a manufacturing centre, the commitment to data processing by Midlands based organisations is still a major one.

This is reflected in the numerous upgrades to equipment, new orders placed and systems development plans users are embarking on.

This has made the Midlands a thriving DP community, where most users have already established themselves in the standard range of applications and are now moving into more advanced areas of the business, where major benefits can be made.

In these areas extensive use is being made of all of the latest software available obviously including online, databases and distributed processing.

So from a career point of view, the Midlands has a lot to offer data processing professionals, but what about the environment — is it all foundries and canals?

Not any more. The Midlands breaks down into the East and West and, without wishing to start a civil war, the West Midlands is the larger centre in terms of computer installations with major concentrations in Birmingham, Coventry, Wolverhampton and the highly industrialised Black Country.

However, even in the West Midlands you can live in a small rural town or village and still commute to the major centres within 30 minutes. A number of large sophisticated computer centres are located in rural areas including Worcester, Burton-on-Trent, and Stafford.

The East Midlands offers two main locations, Leicester and Nottingham, both cities enjoying excellent facilities and are renowned for offering inexpensive quality housing.

It is still possible to buy a modern centrally heated semi-detached house within daily commuting distance of Birmingham for about £16,000.

If you are feeling more ambitious, the Midlands can also accommodate you, but once again the accent will be on value for money.

In addition to being a reasonably priced housing area, there is a wide range of leisure activities, particularly well serviced by sports centres, numerous football and rugby clubs run both by employers and privately.

The National Parks in the Peak District and Wales are close at hand offering a wide range of facilities. The region is well equipped with first division football clubs as well as first class rugby and cricket.

The third most important point to any data processing professional must obviously be salary, having already discussed the installations and environment.

In the Midlands, salaries over the last few years have steadily increased to the point now that most large employers pay experienced data processing professionals well.

In fact, it would appear that salaries on offer in the West Midlands area in particular, do not seem to fall that far short of salaries offered in the Greater London area.

With so many benefits to offer, does the area actually have vacancies? The simple answer is yes. In the Midlands vacancies currently exist at all levels, where the minimum requirements is usually 18 months experience ranging up to the most senior levels.

Companies in the area will pay realistic salaries, but do look for a good educational background, sound practical experience, proven career progression, combined with career stability. Companies generally look for applicants who can communicate fluently and are enthusiastic about their career and the DP industry in general. Inability or lack of desire to communicate on career achievement to a prospective employer is considered a big turn-off. At the more junior levels, especially programming, applicants should be prepared to put their knowledge on trial with an aptitude test or a technical interview.

On the subject of interviews, I have two tips probably apply nationally as well as in the Midlands. If you are interested in a particular job, then be sure to let the employer know of your interest.

I am confident that many applicants have not been offered positions, because they fail to communicate their basic interest in a particular post.

Secondly, if an employer and you have either changed your mind about the interview or cannot make the appointment, then telephone and let them know.

To quote a Southerner who has lived in the West Midlands for ten years, "Civilisation does not cease north of Watford!" The people are generally a little less hostile, particularly in the rural areas. The quality of life is good and employers generally provide quite generous relocation packages to encourage good technicians to join them.

In summarising, I hope I have given an insight to the Midlands where the hard working, enthusiastic computer professional can gain good financial rewards, improved job satisfaction and provide himself and his family with a better standard of living.

In this age of pollution and high living costs, it makes sense to explore the Midlands. You do not know until you have looked, so why not check it out? You will find a great number of people living here who would not consider living anywhere else.




# MARTINS COMPUTER SERVICES

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### MANAGEMENT PROJECT LEADERS
### SYSTEMS ANALYSTS

**SENIOR SYSTEM ANALYSTS WITH EARLY PROMOTIONAL OPPORTUNITIES TO SYSTEMS DEVELOPMENT MANAGER.** At least 5 years O.P specialising in On-Line Retail Commercial Systems Area Warwickshire Salary £7500 plus relocation package. Ref SA205

**PROJECT LEADER.** At least 5 years' O P with formal Cobol background Implementation of at least one System Mini manufacturer. Area Birmingham Salary c. £8000 plus fixed car allowance. Ref SA267

**COMPUTER MANAGER.** Small mainframe. At least 5 years experience on commercial applications using IBM Assembler or RPG. Area Staffs Salary £NEG Ref M69

**PROJECT LEADER & SYSTEMS ANALYSTS.** At least 4 years ex O P knowledge of On-Line Distributive Systems Area -Leicester. Salary: to £8000 Ref. SA224

**COMMUNICATIONS SPECIALIST.** At least 6 years using IBM and Mini Hardware Area Peterborough Salary £NEG Ref SA270

**CUSTOMER SUPPORT ANALYST.** For Pre and Post Support Giving technical guidance to clients. At least 3 years working with UNIX Based Systems Area- East Midlands. Salary. £7000-plus with regular career increments, company car or generous car expenses Ref. SA268

**SENIOR SYSTEMS ANALYST.** At least 4 years' commercial systems Future work will involve using integrated manager Data System in a Real-Time environment. Very latest IBM Hardware. Knowledge of CICS, VS, OL1 an advantage. Scope for advancement. Area- Birmingham Salary £7500 Ref SA231

**COMPUTER MANAGER.** Several years' experience on Honeywell Mainframe and OEC Mini Computer. Area. Staffs. Salary: £ NEG plus company car. Ref-P484

### ANALYST PROGRAMMERS / PROGRAMMERS

**ANALYST PROGRAMMER.** At least 3 years in D P using Cobol Experience with Software Support or Database Design an advantage Area Coventry Salary to £7500 Ref P474

**PROGRAMMER.** At least 1 year programming in RPG II or willing to retrain experienced programmer using another language Area Cotswolds Salary £5800 plus Ref P473

**SYSTEMS SOFTWARE PROGRAMMER & APPLICATIONS PROGRAMMER.** At least 18 months' Cobol preferably working in a DOS environment Experience using any other manufacturer s Cobol considered Opportunities to move into inter-active programming using CICS OL1 DOS/VSE, DB and IP Systems Area Rural Lincolnshire Salary £6510 plus relocation package Ref P17

**ANALYST PROGRAMMER.** At least 3 years in D P. for both maintenance and new development work Main language RPG also Cobol Area North Warwickshire Salary to £8000 plus relocation expenses Ref SA282

**SENIOR PROGRAMMER.** At least 2 years Cobol using a Honeywell GCOS Area. Staffs. Salary. £7000 Ref P494

**PROGRAMMER.** At least 1 years' programming in RPG II or willing to retrain experienced programmer using another language. Area Leicestershire Salary to £8000 Ref P504

**SENIOR PROGRAMMER.** At least 2 years using IBM Cobol Area Leicester Salary to £7700 Ref P330

**SYSTEMS PROGRAMMER.** To 2 years plus Univac Assembler or Cobol. Area Birmingham Salary. to £8600 Ref. P238

**PROG PROGRAMMER.** At least 18 months' experience New IBM 4341 shortly being installed Area: Birmingham. Salary c. £5600 Ref P502

**ANALYST/PROGRAMMER.** At least 2 years programming in Cobol. Area. Wolverhampton. Salary: to £7500 Ref. SA284

**OPERATIONS SUPPORT PROGRAMMER.** At least 18 months' Cobol and Assembler. New On-Line Database System shortly. Area: Northamptonshire Salary. to £8000 Ref P488

### D.P. OPERATIONS PERSONNEL

**OPERATIONS MANAGER.** At least 6 years in O P using IBM Hardware under OS/VS CICS Experience in Software Programming essential Area Worcestershire Salary £NEG Ref MJ1

**OPERATIONS CONTROLLER.** At least 3 years operating ICL 1900 range using George III Area Wiltshire Salary to £8000 Ref. O223

**SENIOR OPERATOR.** At least 2 years operating Mainframe Hardware Area Nottinghamshire Salary to £5500 Ref O227

**SENIOR COMPUTER OPERATOR OPPORTUNITY FOR CAREER PROGRESSION.** At least 5 years using IBM or Univac Hardware Days only Area Birmingham Salary c £5750 Ref O218

**CHIEF OPERATOR.** At least 6 years experience using ICL Hardware under George III and V M E B Area Wiltshire Salary to £9000 Ref. O217

**COMPUTER OPERATORS** required for most areas throughout the MIDLANDS Salary according to experience

**If you do not see the position you require above, please contact us, as we have several more on our register**

**Contact: Graham Aston, M.E.C.I.**
MARTINS COMPUTER SERVICES
First Floor Western House Opposite Albany Hotel
Smallbrook Queensway Birmingham B5 4HQ
Telephone 021 643 2111 24 hour answering service
Evenings and weekends 021 454 0311

021-643 2111 24 hour Answering Service

(1851)



# EAST MIDLANDS

## PROGRAMMERS ANALYSTS PROJECT LEADERS

**Minimum 18 months** **Salaries to £8,000 p.a. and INDEX LINKED**

Our clients are a well established and highly professional computer services organisation. Operating both at home and abroad, they provide consultancy, support services, software products and bureau facilities to external organisations.

Major expansion in the East Midlands has created a number of posts which offer very real career development.

You will have the opportunity to develop your skills at all levels in:

REAL-TIME MINICOMPUTER WORK
A WIDE RANGE OF FINANCIAL AND COMMERCIAL APPLICATIONS
SYSTEMS FROM FEASIBILITY TO IMPLEMENTATION
RPG II, COBOL AND ASSEMBLER.

Current projects involve ICL, IBM Small Business Systems and Philips hardware as well as Microcomputers.

You should offer at least eighteen months' commercial experience. The particular hardware, language or systems are of minor importance.

Salary levels are excellent and INCREASE automatically with inflation. This area offers LOW-COST HOUSING and where appropriate, assistance with relocation will be considered.

Male or female candidates should contact Patrick Convey quoting reference number CW 279.

**COMPUTER PERSONNEL CONSULTANTS**
**4th Floor, The Rotunda**
**Birmingham B2 4PA**
**021-632 6843**

CPC



## NORTH BIRMINGHAM

Our Client, the Computer Services Division of a large Manufacturing Group, is recruiting additional staff to cope with an increasing demand for its services. Group policy is one of developing DISTRIBUTED PROCESSING techniques with terminals allied to the central mainframe. Manufacturers packages are used where possible to handle the wide range of financial and manufacturing systems required. The salaries for these posts will be enhanced by the Annual Review which takes place in November and which should reflect the current rise in the cost of living.

## SYSTEMS CONSULTANT
### £8,500 + NOV. REVIEW

To investigate and postulate solutions to a wide range of business systems problems. Broadly based experience of Manufacturing and Commercial systems is required together with the ability to deal with the clients at all levels.

## SYSTEMS PROJECT LEADER
### £7,500 + NOV. REVIEW

A broad knowledge of Financial systems is required. Some programming and mini computer experience would be useful but is not essential.

To learn more about these excellent opportunities contact Peter Bowen quoting Ref. C1029.
Phone Coleshill (0675) 4896 evenings and weekends.

**Blackwood Associates**
Recruitment Consultants
26 Waterloo Street, Birmingham B2 5TJ.
Telephone: 021-233 2921 (24 hr. service)
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# contracts

*in the Midlands, Avon & Wales*

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RPL Analyst Programmers
Systems Analysts
Honeywell IDS & TDS Analyst Programmers
IBM IMS/DC Specialists
PL1 Programmers
PL1 IMS DB/DC ADS Programmers
Commercial Systems Analysts
ICL VMEB TP IDMS Consultants
Business Analysts/MINI Specialists
ATE Programmers
PDP 11 RSX11M MACRO 11 Programmers

**For contracts in the Avon & South Wales area, please ring Bristol: 0272 292966.**

Ring 021-643 8501 or mail the coupon

*Please provide information about contracts in the Midlands.*
Name _____ Tel.No. _____
Address _____ (Day) _____
_____ (Ev/Wkd.) _____

Mail (no stamp) to FREEPOST, COMPUTER PEOPLE MIDLANDS, Alpha Tower, Birmingham, B1 1BR

Computer People Midlands



# PROGRAMMER
## TOWARDS £6,000
# BROADWAY WORCESTERSHIRE

Our Client, Group 4 Total Security, requires an experienced programmer preferably with RPG II in a commercial environment. However, applications are invited from programmers with any Mainframe language as full training on RPG II will be provided.

Currently using a Univac 90/30 256K. with both Batch and On Line Systems, there are plans for major enhancements on Hardware, Systems and Programming Techniques.

Group 4, with an enviable growth record, is part of the largest security company in Europe. Career Prospects and Fringe Benefits (including Relocation Expenses, a Private Family Medical Scheme and Free Lunches) will be those expected from a major employer.

For a confidential discussion, job description, application form and early interview contact

Hazel Foggin, quoting Ref CS 5060
Phone: Tamworth 56420 evenings and weekends
Reverse charge calls accepted

**Blackwood Associates**
Recruitment Consultants
26 Waterloo Street, Birmingham B2 5TJ.
Telephone: 021-233 2921 (24 hr. service)
A Member of the CPS Group of Companies

# NATURAL SELECTION

## TEAM LEADERS · NOTTINGHAM – TO £7.5K

Applicants will ideally have several years programming experience in one or more of FORTRAN, COBOL AND IBM ASSEMBLER, together with the abilities to design systems and lead a small team of analysts and programmers for one of the top UK companies.
*Contact Reg Heath, quoting ref. RH/J294.*

## ANALYST/PROGRAMMERS · BIRMINGHAM – TO £8K

Ideally you will have real-time systems experience using minis in a commercial or manufacturing environment. You should have good COBOL experience and a knowledge of FORTRAN or ASSEMBLER would give an advantage. These are very good career opportunities.
*Contact Digby A. Dyke, quoting ref. DD/J232.*

## SYSTEMS ANALYST · WEST MIDLANDS – c £9K

Division of major manufacturing group requires Analyst to join small team developing on-line systems on expanding terminal network, utilising latest generation ICL mainframe.
Applicants should have some programming experience. Car mileage allowance is paid for local business travel.
*Contact Mark Ogden, quoting ref. MO/228.*

## MICRO PROGRAMMERS · RURAL WARWICKSHIRE c £9K

Our client needs Programmers experienced in the specification/design and writing of Micro Computer systems for Automation Systems in all Process Industry areas.
The position contains elements of development of NEW standards, including total Customer Contact and Sales Support.
Experience in a real-time operating system and CORAL 66 (or equivalent) is desirable.
*Contact Reg Heath, quoting ref. RH/J298.*

## COBOL PROGRAMMERS · NORTHAMPTON/EUROPE

18 months programming experience, including COBOL skills, could qualify you for this exceptional opportunity with an internationally known and respected company. You are likely to be in your early 20's, ideally have some ASSEMBLER knowledge, and will welcome occasional travel to Europe.
*Contact Mark Ogden, quoting ref. MO/228.*

## SALES – £16K+ ON TARGET · BIRMINGHAM AND MIDLANDS

The leading British supplier of distributed data processing equipment seeks sales person to help pioneer Future Office Systems, utilising real-time hand print terminals and interactive colour televisions. Package includes 1.6L Cortina, expenses and high basic salary.
*Contact Mark Ogden, quoting ref. MO/J245.*

## SYSTEMS ANALYSTS · WORCS. – c £9K

A real opportunity to become involved in the DEVELOPMENT of sophisticated REAL-TIME commercial systems on 4th generation ICL 2900 series hardware. Real career prospects in a superb working environment.
*Contact Reg Heath, quoting ref. RH/J233.*

## COBOL/CICS/DL1 PROGRAMMERS BIRMINGHAM – c £8K

We invite applications from individuals with 'meaningful' experience of COBOL programming in a Database/Teleprocessing environment. Utilising the latest IBM 4th generation hardware, our client is a profitable Major Group of Companies with a total commitment to DEVELOP NEW sophisticated Systems offering long term career prospects in an enlightened working environment.
*Contact Reg Heath, quoting ref. RH/J230.*

**Computer People Midlands**
021·643 8501
Alpha Tower, Birmingham B1 1TT
Computer Services Recruitment Recruiting for clients. VLI Group

## SYSTEMS ANALYSTS · WEDNESBURY – TO £8K

People with 2+ years experience in general commercial systems ideally including order processing, sales ledger or credit control are required urgently. You would be involved with the development of real-time systems on ICL mainframe with 100+ terminals throughout the UK.
*Contact Digby A. Dyke, quoting ref. DD/J297.*

## IBM COBOL PROGRAMMERS · NOTTINGHAM – TO £7.5K

Our client has vacancies at many levels for experienced programmers. Training and career prospects are first class. Many major projects are now being developed using minicomputers, databases and real-time techniques.
*Contact Reg Heath, quoting ref. RH/J296.*

## SENIOR ANALYST PROGRAMMERS · WALSALL TO £7.5K+BONUS

Your 2½ years experience should include IBM OS and PL1 commercial programming. You will be involved at all stages of systems development and design, program specification writing, supervision of programmers, systems implementation and user-training.
*Contact Digby A. Dyke, quoting ref. DD/J292.*

## SUPPORT ANALYST/PROGRAMMER · WEST MIDLANDS – c£6K

Microcomputer systems and marketing organisation with backing from major international group seeks support person with at least one year's experience in systems programming, or a longer involvement in applications programming. Any previous microcomputer experience or ASSEMBLER level programming knowledge will be advantageous.
*Contact Mark Ogden, quoting ref. MO/271.*

## COMPUTER AUDITOR · NOTTINGHAM – TO £6.5K

If you have a minimum of 1 year commercial IBM COBOL programming experience and a desire to work with micros, minis and mainframe, this interesting and challenging position should appeal. Career prospects to analysis are good.
*Contact Reg Heath, quoting ref. RH/J295.*

## APPLICATIONS PROGRAMMERS · BIRMINGHAM – TO £6.5K

People with 12 months+ experience of COBOL (any hardware) or with PL1 ASSEMBLER experience to be trained in COBOL are required by a large multi-national company.
Career progression provided for advancement to Team Leader jobs or move into Systems Analysis work.
*Contact Digby A. Dyke, quoting ref. DD/J231.*

## COBOL PROGRAMMERS RURAL WARWICKSHIRE c£7.5K

A rare opportunity to DEVELOP NEW IMS DATABASE Systems in the MATERIAL CONTROL/ENGINEERING/PROCESS CONTROL and ACCOUNTING areas on sophisticated IBM 3033 hardware utilising the latest DATABASE software. 2/4 years COBOL experience and a desire for analysis involvement is essential.
*Contact Reg Heath, quoting ref. RH/J299*

## CICS PROGRAMMER WEST MIDLANDS – UP TO £7K

Experienced IBM CICS programmer seeking involvement with design work will be attracted to this post. International company with modern premises offers on-line mainframe installation. COBOL experience is desirable, and knowledge of DL/1 will be advantageous. Candidates will preferably have worked in a DOS/VS environment.
*Contact Mark Ogden, quoting ref. MO/S1.*

**Response Procedure:** *To obtain more details, telephone for a confidential application form or send the coupon (no stamp required) to:* **FREEPOST, Computer People Midlands, Alpha Tower, Birmingham, B1 1BR.**

I am interested in job ref. no. _____
Name _____
Address _____
_____
Tel. No. (Day) _____ (Ev/Wkd) _____

## MIDLANDS & NORTH-WEST

**C.£7,000 — SYSTEMS ANALYST — Warley — B801**
Experienced Business Systems Analyst to work on Real Time manufacturing applications in a small systems department

**C.£6,000 — APPLICATIONS PROGRAMMER — W/hampton — B803**
Interesting and wide ranging applications on-line, interactive systems development COBOL essential PLAN, FILETAB useful

**TO £8,500 + rel. — SYSTEMS PROGRAMMER — Stafford — B808**
Minimum 12 months experience IBM under OS with IMS/TSO/RJE

**c £8,500 + rel. — SENIOR ANALYST — Manchester — B808**
Responsible for the development of a wide range of systems background should include COBOL experience.

**To £7,000 — SYSTEMS ANALYSTS — Cheshire — B813**
Experienced Analysts with commercial applications background and preferably programming experience.

**C.£6,000 — PROGRAMMERS — Dudley — B818**
Experienced. PL1. Commercial Applications Programmers for manufacturing systems

**£7,000 + — SYSTEMS ANALYST — Smethwick — B918**
Broad based systems experience with a programming background for on-line manufacturing and commercial applications

Consultant: Peter Bowen.

## BIRMINGHAM

**To £7,000 — PROGRAMMER — Birmingham — 5/826**
Assembler Programmer with 2/3 years' experience Micro and Mini applications Some knowledge of Basic would be useful.

**£6,000-£7,500 — SYSTEMS ANALYSTS — Birmingham — 5/826**
Preferably a COBOL programming background. 2/3 years' analysis experience on Accounting or Financial applications.

**To £8,000 + car — PROGRAMMERS — Birmingham — 8/824**
Good COBOL background required Preferably IBM mainframes Experience of OL1 useful. Bureau/Software House environment

**£6,000 + bonus — PROGRAMMER — Birmingham — 5/822**
A Level education. Assembler programming experience for Accounting and Order Processing applications.

**To £6,800 — SENIOR PROGRAMMER — Birmingham — 5/818**
2-3 years' good programming experience. Production applications on development work Control of staff

**To £7,000 — SENIOR PROGRAMMERS — Birmingham — 5/818**
Up to 3 years' COBOL experience, to lead 1-2 programmers on development work. T.O.S experience would be useful.

**£7,500 — PROGRAMMERS — Birmingham — 5/686**
Programmers with good COBOL experience CICS and OL1 an advantage. Large IBM mainframes, expanding commercial environment.

Consultant: Christine Pountney.

## SOUTH MIDLANDS & WEST COUNTRY

**Up to £5,500 +18% S/A — SENIOR OPERATOR — Worcs. — W258**
3 years' experience IBM/DOS. 2 shifts.

**Up to £7,000 — PROGRAMMER — Worcs. — W257**
3 years IBM CICS experience, PL1 or COBOL.

**Up to £7,500 — SENIOR ANALYST — West Country — W281**
3 years' experience as an Analyst. IBM Installation. Manufacturing/Financial/Commercial.

**Up to £4,500 — JUNIOR OPERATOR — Bristol — W282**
1-2 years' experience, IBM Installation, Bureau environment, 3 shifts.

**C.£7,000 — SYSTEMS ANALYST — Avon — W288**
Some programming experience, ICL installation. Manufacturing/Financial/Commercial work.

**Up to £6,000 — PROGRAMMER — Glous. — W288**
2/3 years' COBOL experience, preferably some design experience. IBM installation.

**Negotiable — PROGRAMMER — Somerset — W273**
2/3 years' COBOL experience, preferably on ICL equipment.

Consultant: Hazel Paggin.

## NORTH-EAST MIDLANDS

**£7/8K — SYSTEMS ANALYST — Sheffield — C403**
4 years' experience of Honeywell 84/60. To work on interactive systems including raw material stock control.

**C.£6,500 — ANALYST PROGRAMMER — Leeds — C415**
2 years' experience in COBOL programming. ICL equipment. Commercial environment.

**£8,000-£8,800 — PROGRAMMER — Derby — C428**
2/3 years' experience using IBM Assembler language. Mainframe programming.

**£6,500-£8,000+ Benefits — PROGRAMMER — Leeds — C433**
At least 3 years' Assembler Programming experience ideally with knowledge of CICS/VS, OSV1. Financial environment.

**£6,000+ — OPERATOR — Derby — C434**
Preferably experienced on ICL hardware. Solely responsible for operating network system.

**£Negotiable — PROGRAMMER — Nottingham — C436**
3 years' COBOL programming experience and experience in developing major systems.

**£4,500-£6,000 — PROGRAMMER — Leicester — C437**
Minimum of 1 year's COBOL Programming, ideally on Honeywell equipment.

Consultant: Roger Carr.

## SOUTH-EAST MIDLANDS

**£Negotiable — SYSTEMS ANALYST — Works. — EM803**
2-3 years' experience in design, preferably in manufacturing, financial or marketing environment.

**£6,500-£8,500 — SYSTEMS ANALYST — Bedfordshire — EM804**
Minimum 8 months' analysis experience, preferably on ICL equipment. Manufacturing environment.

**To £9,000 — SENIOR ANALYST — Peterborough — EM807**
5 years' analysis experience (preferably IBM). Database and data analysis. Commercial environment.

**To £9,000 — SENIOR PROGRAMMER — Peterborough — EM808**
5 years' IBM COBOL experience. Financial/business background. Some supervisory experience.

**£Negotiable — PROGRAMMER — Coventry — EM811**
Sound programming experience using COBOL language and ICS. Bureau environment.

**£Negotiable — SYSTEMS ANALYST — Cambs. — EM809**
To develop new systems and enhance existing systems using minis and IBM mainframe. Knowledge of programming an advantage.

**£Negotiable — ANALYST/PROGRAMMER — Coventry — EM798**
To implement, develop and maintain software for both on-line and batch systems. TIP/CMS and DMS 1100.

Consultant: Margaret Bruce.

Interviews any time between 9 a.m.-5.30 p.m. Evenings and weekends by appointment. Reverse charge calls accepted. Write: Blackwood Associates, Freepost, Birmingham B2 4BR. (1479)

**Blackwood Associates**
**Recruitment Consultants**
26 Waterloo Street, Birmingham B2 5TJ
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# ARE YOU GOOD ENOUGH FOR PROJECT RECRUITMENT?

We have fewer people on our books than any other recruitment agency. That's because a lot of people aren't good enough. Life's hard and our clients haven't got time to waste interviewing unsuitable applicants.

Right now we need bright people with programming experience for good career-building appointments throughout the Midlands. If you are currently working in London or the South-East, the same salary in the Midlands could give you substantially more disposable income and a better quality of life, if you are from elsewhere the Midlands still has much to offer.

**If you think you are good enough ring Peter Keay on 021-643 8118, or write and we'll send you a Personnel Profile to fill in.**

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Registered Office Fifth Floor Scala House Holloway Circus Birmingham 1 Tel 021-643 5118

# EAST MIDLANDS

## PROGRAMMERS ANALYSTS PROJECT LEADERS

**Minimum 18 months** — **Salaries to £8,000 p.a. and INDEX LINKED**

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- REAL-TIME MINICOMPUTER WORK
- A WIDE RANGE OF FINANCIAL AND COMMERCIAL APPLICATIONS
- SYSTEMS FROM FEASIBILITY TO IMPLEMENTATION
- RPG II, COBOL AND ASSEMBLER

Current projects involve ICL, IBM Small Business Systems and Philips hardware as well as Microcomputers.

You should offer at least eighteen months' commercial experience. The particular hardware, language or systems are of minor importance.

Salary levels are excellent and INCREASE automatically with inflation. This area offers LOW-COST HOUSING and where appropriate, assistance with relocation will be considered.

Male or female candidates should contact Patrick Convey quoting reference number CW 279.

CPC
**COMPUTER PERSONNEL CONSULTANTS**
**4th Floor, The Rotunda**
**Birmingham B2 4PA**
**021-632 6848**

(1474)

LOUGHBOROUGH TECHNICAL COLLEGE
PRINCIPAL: O. W. Hutchings, MA, MSc
DEPARTMENT OF ELECTRICAL ENGINEERING
Applications are invited for the post of

## LECTURER II in DATA PROCESSING

to commence: 1st September, 1980

To teach data processing and computer science in computing, business studies, tourism and other courses at National Certificate and Diploma level. Duties will include the development of course material, demonstration of equipment and liaison with several departments.
Applicants should have appropriate academic qualifications, have relevant experience and should preferably be teacher-trained.
Salary will be in accordance with scales for teachers in Further Education establishments (Lecturer II — £4851-£7794 pa) with placing on the scale according to qualifications and experience.
Further particulars may be obtained from the Principal, Loughborough Technical College, Radmoor, Loughborough, Leicestershire LE11 3BT [illegible]

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### UNIVAC ANALYSTS & PROGRAMMERS CHESHIRE, to £9,000

A large commercial user, currently developing network systems with thousands of terminals, has an on going requirement for experienced Univac or microprocessor staff capable of making an early contribution towards project development. Any experience of Univac 1100 series will be especially valuable. Additional attractive fringe benefits include Montague subsidiaries, Life Assurance, Pensions and Permanent Health Schemes, Flexitime, BUPA and Personal loans. Top employment prospects are here. All you need do is phone for an application form today

Contact: Carol Atrak — 0782 622888

### SYSTEMS ANALYSTS/CONSULTANTS NORTH WEST 7K to 11K packages

EMS urgently need many more additional Analysts to work on consulting support assigned to large commercial client sites. All candidates should be educated to a minimum A level standard and possess at least 3 years' systems experience with involvement in installing two major systems. Previous Cobol programming experience would be useful. Candidates will be assigned to work at client sites often under the control and direction of client management. A high degree of professionalism is sought with a stable personality. Typical system under development are in the areas of finance and distribution. We prefer staff already resident in Lancashire, Cheshire or Merseyside. A car will be essential and a commitment to undertake a degree of travelling whenever occasioned. Attractive salaries and expense allowances are available

Contact: Colin Phillips — 0782 623888

### TOP PROJECT/PRODUCT MANAGERS - BIRMINGHAM £8,000 plus and Car Allowance

Contact: Ian Cooper — 021-454 7908

### SALES MANAGERS & SALESMEN TURNKEY, to £25,000

Contact: John Wood — 0782-622888

### COBOL PROGRAMMERS/ANALYSTS VARIOUS — COVENTRY to £7,500

Contact: Diane Butler — 021-454 7908

### ICL SOFTWARE SALESMAN MIDLANDS & NORTH to £15,000

Contact: Don Watkins or John Wood — 0782-622888

### ICL 2900 SYSTEMS DESIGNERS & COBOL PROGRAMMERS STAFFORDSHIRE. Negotiable

Contact: Don Watkins — 0782-622888

### SYSTEMS SUPPORT PROGRAMMER/ANALYST LONDON — ACTON, 6K to 7K

Contact: Carol Atrak — 0782-622888

### IBM ANALYSTS/PROGRAMMERS MIDDLESEX Negotiable

... so the ability to interface effectively into this environment will be important. OP is an established entity and plays an important role in user services.

Contact: Carol Atrak — 0782-623888

### ANALYSTS & PROGRAMMERS SURREY £4,000 to £9,500

... travelling to subsidiary sites which could include general manufacturers, optical equipment manufacturers, through to film studios. Any mini experience would be especially valuable if with small IBM's or DG Novas.

Contact: Carol Atrak — 0782-623888

### SALESMEN PACKAGE FRANCHISING TO TURNKEY GROUPS, TO £20,000

... level negotiators will be recruited to cover the entire UK software service sector, and to promote our products to established manufacturers. Company cars and usual business expenses will be provided in addition to attractive basic salaries for proven performers. Previous experience in selling to the service sector would be advantageous and especially involving software products, or general Turnkey Systems. Apply initially for an application form to:

Tony Kline, Marketing Manager — 021-454 7908

### SYSTEMS CONSULTANTS & SOFTWARE DESIGNERS LONDON & HOME COUNTIES 7K - 10K

... DP. Familiarity with microprocessor and communications work in the areas of operating systems design, message switching, hardware diagnostics and compilers, would be especially advantageous. The client is a London based consultancy with many years' established track record and a significant annual expansion rate.

Contact: Carol Atrak — 0782-623888

### CONTRACT £250-£350 P.W.

**SOUTHERN**

Data General Cobol/Basic Analysts & Progs — Acton — 6 months
IBM Analysts — Life Assurance — South Coast — 6 months
IBM Progs — Cobol OS — South Coast — 6-12 months
Honeywell L66 Cobol Progs — IDS/TDS GM4 — Essex — 6-12 months
ICL New Range Cobol SCL VME6/K — Middlesex/Herts — 6 months
IBM Analysts — Watford — 6 months
IBM Progs — DOS/VS — Peterborough — 6 months
IBM Progs — PL/1 — IMS/CICS OS — Kent — 6 months +
Honeywell L66 Analysts & Progs — West Country — 6 months
IBM Banking — City — 9-12 months
IBM Progs — Cobol — DOS CICS — Berks — 6 months
Hewlett Packard Progs — Fortran — OR experience — 6 months

### CONTRACT £250-£350 P.W.

**MIDLANDS**

IBM Cobol Progs — Birmingham — 6 months
IBM Progs — PL/1 IMS DB/DC — Birmingham — 1 year
DEC RSX 11 MACRO RTL2 — Birmingham — 3-6 months
IBM Cobol — IMS/DC — Staffordshire — 6 months
Honeywell L6 — Technical Systems Prog — Staffordshire — 6 months
ICL 2900 Cobol Progs/Fortran Progs — Staffordshire — 6 months

### CONTRACT £250-£350 P.W.

**NORTHERN**

Honeywell L66 Cobol — IDS/TDS Progs — Liverpool — 6 months +
Analysts — any hardware — Commercial — Liverpool — 1 year +
ICL 1902 Progs — Cobol Filetab — Manchester — 3 months
Coral Progs — Real-time — Merseyside — 6-12 months
IBM Progs — Cobol OS CICS — Manchester — 4 months
DEC Operators — PDP/11 RSTS — Ayr — 6 months
Honeywell L66 Progs — DM4 — Northumbria — 6 months
IBM Assembler Progs — CICS — York — 3-6 months
IBM Progs — DOS/VS Cobol CICS DL/1 — Manchester — 2 years
Univac 1100 — Assembler Fortran — Exec 8 — Manchester — 3 months

### CONTRACT £250-£350 P.W.

EMS

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WRITE TO RECRUITMENT DIVISION
E.M.S. CONSULTANTS LTD.
61-63 LOWER STREET
NEWCASTLE-UNDER-LYME, STAFFS. ST5 2RS

(1660)

## Computer Operations Professionals

# What goes up must come down, right? Wrong.

And just who do we think we are, defying the laws of gravity? Well, we're BL Systems Limited, and the reason we're so sure that Sir Isaac Newton was misinformed is quite simple–all these positions have been created as a direct result of internal promotions and expansion. When men and women start going up in our company, they keep right on going, thanks to our programme of continual training and personal development. All the positions are based at our large ICL-based Data Centre in Cowley, Oxford–except for some IBM Operating posts located at the Cowley Service Data Centre, linked to our CDC at Redditch. It's a case of pleasing all of the people all of the time...

### Operators £5,500-£7,000

For the ICL operating jobs, you'll need experience of running under G3, DME or VME/B to join our highly professional team.

IBM Operators need knowledge of MVS/JES, and will operate remote job entry terminals, submitting input, controlling workflow and completing work schedules to agreed deadlines.

In all cases, we work a 3 shift, 24 hour/5 day system, and voluntary overtime is available.

### Network Controller c. £6,000

Here, you'll join a compact team supporting RJE, TP and MOP users and be responsible for hardware and software support–e.g. FEP modems, DCP's, TCP's and TE's. ICL 1900/2100 series and VME/B experience would be an advantage.

### Operations Support Analyst c. £6,000

Working with a team providing a link between development, operations and users, your experience must include JCL, ICL G3 and/or VME/B operating systems. A flair for problem solving would be beneficial.

IBM people can skip this paragraph. The Data Centre operates a 2960/DME + 1904S running under G3 Shared Filestore operating system with RJE, TP, MOP and batch users–we'll shortly be embarking on a new phase to VME/B using large mainframes in our continued growth, to provide service to our users.

These are not just jobs, but real career opportunities with salaries, relocation packages and other benefits to match–if you'd like to find out all the details please phone Ray Brown, our Operations Manager, on Oxford (0865) 778966 ext. 3293 or write for an application form to: Wendy Brown, Co-ordinator, Personnel Development, BL Systems Ltd., Data Centre P.O. Box 5, Redditch, Worcs.

Look out, Einstein, you're next on the list...

(1552)

# Computer Professionals Come to South Africa on contract or permanent appointment

South Africa's mining industry is growing, and our client, a major Mining Corporation, is growing too. They need new skills for the technological applications of the 1980's.

### Senior Technical Analyst/ Programmer

**Up to £11,000 p.a. plus bonus**

To be responsible for the design, programming, documentation and maintenance of a variety of technical computer systems, as well as advise on their use and application. Notably geo-statistical ore reserve systems, financial risk analysis and econometric modelling, computer control of sophisticated analytical instrumentation and laboratory data flow as well as mining exploration and planning projects.

Experience in any of the above would be a decided advantage, but is essential to have had a minimum of 5 years' technical systems/programming experience in FORTRAN preferably allied to a degree in Computer Science or Applied Mathematical Statistical training.

### Programmers

**Up to £8,500 p.a. plus bonus**

To be responsible for the production and maintenance of working programmes from written specifications according to established standards for a variety of commercial and technical applications in the mining industry. A minimum of 2 years' programming experience in COBOL and RPG.II is essential, preferably allied with formal tertiary training in Computer Science and a knowledge of FORTRAN.

Available on contract or permanent basis, these positions offer a minimum of 8½% annual bonus, free housing, relocation allowance and paid airfare for self and family, plus other benefits, including medical insurance.

South Africa offers a change for the better; lower cost of living and taxation — the purchasing power of the Rand is approximately equal to that of the Pound and VAT is only 4% — good climate, excellent schooling, recreational and sporting facilities.

The salary quoted is converted at £1 = R1·80 as at 21st April 1980. Interviews will be conducted in London and at other major centres. For a full discussion please contact Keith Robson on 01-439 3301 between 9 a.m. and 5 p.m.; or write in complete confidence with full career details and a contact phone number to reach him before 27th June 1980 at Austin Knight Limited, London W1A 1DS, quoting reference TST.

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**ANALYSTS** £
(DR/1484) 5+ years project leader database experience ... 8750
(DR/1485) 18+ months analyst/programmers COBOL ... 8500
(DR/1486) 3+ years senior manufacturing experience ... 8000
(DR/1487) 3+ years IBM commercial systems ... 8000
(DR/1488) 2+ years analyst/programmers PL/1 ... 8000
(DR/1489) 2+ years commercial/financial experience ... 8000
(DR/1490) 2+ years database design COBOL ... 8000
(DR/1491) 4+ years analyst/programmers COBOL CICS IMS ... 7500
(DR/1492) 2+ years senior COBOL background ... 7500
(DR/1493) 3+ years commercial IBM ... 7000
(DR/1494) 18+ months commercial O & M background ... 7000
(DR/1495) 2+ years commercial systems ... 6500

**PROGRAMMERS**
(DR/1496) 5+ years lead programmer IBM COBOL CICS ... 9000
(DR/1497) 2+ years PL/1 ... 7500
(DR/1498) 2+ years COBOL experience ... 7500
(DR/1499) 2+ years COBOL CICS experience ... 7500
(DR/1500) 18+ months FORTRAN and/or COBOL ... 7000
(DR/1501) 2+ years PL/1 or ASSEMBLER CICS ... 6750
(DR/1502) 3+ years senior programmer COBOL commercial ... 8000
(DR/1503) 18+ months PL/1 degree education ... 6000
(DR/1504) 12+ months ICL COBOL ... 5500
(DR/1505) 6+ months COBOL ... 4500

## EAST MIDLANDS

**ANALYSTS** £
(DR/1506) 5+ years senior financial background ... 9000
(DR/1507) 4+ years senior commercial ... 9000
(DR/1508) 3+ years project leader financial experience ... 9000
(DR/1509) 3+ years senior commercial experience ... 8500
(DR/1510) 3+ years senior analyst/programmers COBOL ... 8000
(DR/1511) 2+ years analyst/programmers on-line real time ... 8500

**PROGRAMMERS**
(DR/1512) 5+ years lead programmer IBM COBOL ... 8000
(DR/1513) 8+ years team leader ICL COBOL ... 8500
(DR/1514) 2+ years systems programmers DOS CICS ... 8500
(DR/1516) 3+ years senior ICL COBOL ... 7750
(DR/1516) 4+ years ICL COBOL ... 7750
(DR/1517) 4+ years senior ICL COBOL ... 7500
(DR/1518) 2+ years COBOL CICS DL/1 ... 7500
(DR/1519) 3+ years COBOL technical/commercial ... 7000
(DR/1520) 2+ years IBM COBOL CICS ... 7000
(DR/1521) 2+ years COBOL and/or ASSEMBLER ... 7000

MIDLANDS CONTACT ROGER PICKIN

## NORTH EAST

**ANALYSTS** £
(DR/1522) 3+ years senior analyst commercial environment ... 8000
(DR/1523) ssnior analyst – manufacturing systems ... 7500
(DR/1524) senior analyst – financial systems ... 7500
(DR/1525) 3+ years including programming background ... 8500
(DR/1528) 2+ years commercial (COBOL background) ... 6600
(DR/1527) 2+ years commercial IBM installation ... 8500
(DR/1528) 18+ months production control experience ... 5500

**PROGRAMMERS**
(DR/1529) 2+ years COBOL – commercial ... 7000
(DR/1530) 2+ years PL/1 preferred ... 6250
(DR/1531) 2+ years COBOL ... 6250
(DR/1532) 18+ months IBM COBOL some CICS experience ... 5700
(DR/1533) 12+ months IBM experience preferred ... 6000

## HUMBERSIDE

**ANALYSTS** £
(OR/1534) 3+ years senior commercial/financial ... 8000
(OR/1535) senior analysts manufacturing systems ... 7750
(OR/1536) 3+ years database commercial systems ... 7500
(OR/1537) 3+ years analyst/programmers ICL background ... 7000

**PROGRAMMERS**
(OR/1538) 4+ years senior COBOL and ASSEMBLER ... 7500
(OR/1539) 3+ years senior programmer IBM installation ... 7000
(OR/1540) 3+ years COBOL ... 6750
(OR/1541) 3+ years ASSEMBLER CICS ... 6750
(OR/1542) 12+ months programmer ICL preferred ... 5500

NORTH EAST AND HUMBERSIDE CONTACT ROY DRURY

## GREATER MANCHESTER

**ANALYSTS** £
(DR/1543) 18+ months commercial – IBM site ... 6250
(DR/1544) 18+ months commercial – ICL preferred ... 5500
(DR/1545) 2+ years manufacturing systems ... 5750
(DR/1546) 2+ years financial systems ... 7000
(DR/1547) 3+ years – IBM preferred ... 7500
(DR/1548) 3+ years commercial COBOL background ... 7500
(DR/1549) senior analysts financial systems ... 8000
(DR/1550) senior analysts manufacturing systems ... 8000
(DR/1551) senior analysts IBM or ICL background ... 8250

**PROGRAMMERS**
(DR/1552) 18+ months ICL COBOL ... 8000
(DR/1553) 18+ months IBM COBOL ... 8250
(DR/1554) 2+ years ICL COBOL ... 6500
(DR/1555) 2+ years IBM COBOL ... 6500
(DR/1556) 2+ years Honeywell COBOL ... 8500
(DR/1557) 2+ years IBM ASSEMBLER ... 7000
(DR/1558) 3+ years IBM COBOL ... 7500
(DR/1559) 3+ years Honeywell COBOL ... 7500
(DR/1560) 3+ years ICL COBOL ... 7500
(DR/1561) chief programmers – IBM preferred ... 8250

## LANCASHIRE

**ANALYSTS** £
(DR/1562) 18+ months analyst/programming ... 8250
(DR/1563) 18+ months commercial (COBOL background) ... 8250
(DR/1564) 2+ years commercial – ICL preferred ... 8000
(DR/1565) 2+ years financial systems ... 7000
(DR/1566) 2+ years commercial – IBM site ... 7500
(DR/1567) 3+ years commercial – ICL preferred ... 8000
(DR/1568) 3+ years financial systems ... 8000
(DR/1569) 3+ years commercial – IBM preferred ... 8000
(DR/1570) senior analysts commercial systems ... 8500

**PROGRAMMERS**
(DR/1571) 18+ months ICL COBOL ... 6000
(DR/1572) 18+ months IBM COBOL ... 6250
(DR/1573) 18+ months Honeywell COBOL ... 6250
(DR/1574) 18+ months IBM ASSEMBLER ... 6500
(DR/1575) 2+ years IBM COBOL ... 7000
(DR/1576) 2+ years Honeywell COBOL ... 7000
(DR/1577) 2+ years ICL COBOL ... 7000
(DR/1578) 3+ years IBM ASSEMBLER ... 7500
(DR/1579) 3+ years IBM COBOL ... 7500

## MERSEYSIDE

**ANALYSTS** £
(DR/1580) 12+ months commercial ... 6500
(DR/1581) 18+ months commercial ... 6000
(DR/1582) 18+ months commercial (COBOL background) ... 6250
(DR/1583) 18+ months manufacturing systems ... 5250
(DR/1584) 18+ months commercial – IBM preferred ... 8500
(DR/1585) 2+ years production systems ... 7000
(DR/1586) 2+ years commercial – IBM site ... 7000
(DR/1587) 2+ years analyst/programming DEC background ... 7000
(DR/1588) senior analysts commercial systems ... 7500
(DR/1589) senior analysts manufacturing systems ... 8000
(DR/1590) senior analysts – IBM preferred ... 8250

**PROGRAMMERS**
(DR/1591) 18+ months BASIC on PDP-11 ... 8000
(DR/1592) 18+ months ICL COBOL ... 6000
(DR/1593) 18+ months IBM COBOL ... 6000
(DR/1594) 18+ months Honeywell COBOL ... 5000
(DR/1595) 2+ years ICL COBOL ... 5250
(DR/1596) 2+ years PDP-11 BASIC ... 5250
(DR/1597) 2+ years IBM ASSEMBLER ... 7000
(DR/1598) 2+ years IBM COBOL ... 7000
(DR/1599) 3+ years COBOL any mainframe ... 7500
(DR/1600) senior programmers – Honeywell preferred ... 6000

## YORKSHIRE

**ANALYSTS** £
(DR/1601) 18+ months analyst/programming ICL site ... 8500
(DR/1602) 2+ years commercial systems ... 7000
(DR/1603) 2+ years financial systems ... 7250
(DR/1604) 2+ years commercial – ICL preferred ... 7500
(DR/1605) 3+ years commercial (COBOL background) ... 8000
(DR/1606) 3+ years commercial – IBM preferred ... 8000

**PROGRAMMERS**
(DR/1607) 18+ months ICL COBOL ... 6250
(DR/1608) 18+ months IBM COBOL ... 6600
(DR/1609) 2+ years RPG II ... 6500
(DR/1610) 2+ years IBM ASSEMBLER ... 7000
(DR/1611) 2+ years COBOL any mainframe ... 7000
(DR/1612) senior programmers – ICL site ... 7500

NORTH WEST & YORKSHIRE CONTACT CATHY SCOTT

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DATA RESOURCES

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**EXPERIENCE**
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Some systems design
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Preferred age 25-30

**APPLICATIONS**
In writing to
Mr. S. Joyce
Staff Manager
Credit Industriel et Commercial
74 London Wall
London EC2M 5NE

# COMPUTER SHIFT LEADER

Person required to lead a team of operators responsible for the Centre's computers.
Equipment currently installed consists of an ICL 1903T running under GEORGE 3 and MAXIMOP, and a dual-processor Prime computer system running under PRIMOS and PRIMENET and supporting 64 terminals. Applicants should be educated to at least "A" level standard and have experience of operating in a medium to large computer installation. A two-shift system is worked, and the salary will be in the T3 scale, [illegible], an additional 14% shift bonus is also payable.

Further details and application forms from the Deputy Administrator, Oxford Polytechnic, Headington, Oxford OX3 0BP.
(1808)

# BOX Nos.

Box number replies should be addressed to:

**Box No. .......**
**c/o Computer Weekly**
**Dorset House**
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**London SE1 9LU**

**OCC**

Specialists since 1971 in UK and International computer appointments. We have many other jobs on our files and offer a career counselling service to computer professionals.

# DOS/VS SPECIALIST

**W. Germany** **£Rewarding**

A technical support division is being established to assist our clients with the expansion of their European Network.
You must be capable of working with a minimum of supervision and be conversant with DOS software and JCL. Ideally you will also have TP network and/or RJE experience.
Client interviews are to be held in London on July 1st.

To apply please telephone Karen Rizzello on 01-242 9356 or write to OCC Computer Personnel Ltd., 16 Bedford Row, London WC1 4EB quoting reference 106/CW.
(1594)

# Graphics Software for Computer Aided Engineering

## CAD Centre, Cambridge

As the acknowledged leaders in supplying consultancy services, software packages and computer aided engineering systems to industry, we can offer considerable scope to people joining us in this field of rapid growth. Having recently implemented a major expansion, we now have a number of key positions to fill in our teams concerned with applications and support activities such as advanced computer graphics, data communications, database management systems and language processing.

We are particularly anxious to recruit individuals with experience in computer graphics.

### Project Manager

You will guide projects through all their stages, so experience of client negotiations, specification and implementation is essential. You must have experience of real-time or micro-based development or production engineering applications. Previous supervisory experience is also necessary. (MJ/W 1679A)

### Engineers & Programmers

This is an ideal opportunity for flexible, ambitious young Engineers and Programmers. We are particularly looking for people who are both, and have experience with N.C. software or graphics on Computer Automation or PDP-11 machines. You should have a degree and have either worked for a software house, production engineering department or on computer systems development in a manufacturing environment. (MJ/W 1679B)

### GINO Development

We need Programmers to help us support and develop the GINO-F family of graphics products. These products are sold throughout the world and are implemented on almost every type of mainframe and mini-computer.

We are now producing micro-computer implementations and we are enhancing the product range to exploit raster displays. (HF/W 1679A)

### Visualisation

Here we need Programmers who can help us produce our next generation of visualisation software. This will allow models and scenes to be assembled and manipulated interactively. From these models it will be possible to produce wire-line, hidden-line or hidden surface views in a variety of forms, e.g. line plots, half tone or full colour displays. (HF/W 1679B)

*The CAD centre is a 150 strong, self-contained unit staffed by leading practitioners in the application of computers to design and manufacture. We use a wide range of mini-computers, mainframes and increasingly micros, both our own and our clients'. We enjoy the advantages of a small organisation with all the benefits of a large company. Cambridge and its surroundings offer urban or rural living and the facilities of a much larger town.*

*We pay good salaries to the right men and women, help with relocation and offer opportunities for rapid promotion.*
*If you have the skills that we can use in this demanding business then phone Hugh Fingland or Maurice Jones on Cambridge (0223) 63125 quoting the appropriate reference, or write with a short c.v. to Miss Pat Edwards, CAD Centre, Madingley Road, Cambridge CB3 0HB.*

**Computer Aided Design Centre**

# COMPUTER PROFESSIONALS!

## *Informal interviews will be held at;*

***The Café Royal in Regent Street on Tuesday, June 24th 1980 from 12.00 hrs until 21.00 hrs***

**SOFTWARE ENGINEERS PROGRAMMERS**
Salaries to **£11,000**
with usual benefits

**SYSTEMS DESIGNERS LIMITED**

Systems Designers Limited is a British computer systems consultancy specialising in mini and micro-based systems for the highly demanding Defence and industrial real-time fields and also in exciting new developments such as Viewdata. In 11 years the company has grown to 220 professional [illegible]

To satisfy our continued growth we seek additional **SOFTWARE ENGINEERS AND PROGRAMMERS** to help us solve the theoretical and practical problems posed by this high technology industry, mainly in the areas of:

**Defence systems** — Avionics, Radar systems, Complex dynamic rigs, Simulators and Modelling.

**Command and control** — Data retrieval and dissemination; Voice, data and message network design; Management systems, Message, telex and packet switching. Computer communication protocols.

**Industrial systems** — Process monitoring and control; Plant control simulation, High speed data retrieval and analysis, Real-time telemetry control, Distributed microprocessor systems.

**Product development** — Viewdata systems, Text retrieval packages, Portable CORAL 66 compiler, CONTEXT microprocessor development system, Real-time program development systems, Embedded multicomputer systems, design and implementation of Ada compiler.

If you have a good academic background and experience in mini or microprocessor systems, please call in for a drink and chat with our Managers and Consultants who will be happy to discuss the exciting future you could enjoy with Systems Designers Limited, or if you are unable to make June 24th, telephone Sue Watts for an application form and brochure — ask the operator for Freefone 3179 or write to: [illegible]



**JBA**

# IDMS Technical Consultant

**Belgium** **£24,000 – £30,000 p.a.**

One of the most highly respected Consultancy organisations in the U.K. is currently running a major database development project in Belgium, for which a highly skilled Technical Consultant is now required to take on the DBA function. This is not a job which could be undertaken by a straight analyst, or even by a database designer, since in-depth knowledge of how a database is built is essential.
The appointee will receive a U.K. salary of up to £15K, plus living expenses of around £300 p.wk (tax-free) whilst in Belgium. The company would, in fact, like to see a branch office opened in Belgium in the medium term, so career advancement opportunities are extremely exciting. **Contact: Andy Wright**

# FORTRAN Analyst/Programmers

**Holland** **stat c.Hfl 50,000 to Hfl 60,000**

Opportunities are now coming to light for a couple of highly qualified, young Fortran progressing specialists who have worked in a scientific/technical sphere for between two and four years, to join the Dutch branch of one of the U.K.'s most dynamic and successful Consultancies.
If you have this type of experience and wish to join a company which can open up your career prospects quite substantially, phone for an informal discussion.
**Contact: Andy Wright**

# Burroughs Large Systems Software Designers

**Hants and Cheshire** **to £10,500**

Our client is now recruiting for the initial design stage of a major command and control project which is scheduled for completion in two years. Software designers who can demonstrate several years design experience and have spent at least one of these years working with Burroughs Large Systems software including:- MCP, GEMCOS, NDL, DMSII. A thorough knowledge of COBOL and ALGOL programming languages will be necessary and candidates should be able to take over control of a small design team straight away.
Excellent career opportunities with this high-level technical consultancy.
**Contact: Margaret Stevens**

# Designers – Industrial Systems

**Berkshire** **c.£8,500**

A large well-known manufacturer has opportunities for Systems Designers to work on the development of real-time industrial systems using mini and microcomputers.
Applicants must have at least four years experience in design and programming of automation, military or process control systems and should be familiar with a real-time language such as CORAL or RTL/2.
Salaries are negotiable according to experience. Large company benefits including an excellent relocation package. **Contact: Jim Baker**

# Analyst Programmer

**East London** **c.£8,000**

This is an excellent opportunity for a move into management with a small Data Processing department at a manufacturing company servicing the catering industry, who are currently involved in installing a new NCR mini.
Experience of NCR hardware is not essential as full training will be given, but a good appreciation of hardware, software and ancillary equipment, plus approximately 2 years working knowledge of COBOL or basic language is essential. Good organisation and man management skills with the ability to communicate at all levels, are of prime importance. **Contact: Janet Chilvers**

# Analyst/Programmer

**Croydon** **c.£8,000**

Our client, a large international organisation, has immediate vacancies for Analyst/Programmers to join the commercial development teams. Applicants should have at least three years ANS COBOL programming experience on IBM equipment and have had some involvement with systems design, preferably in accounting, general commercial or database applications.
This is an exciting opportunity to work on new IBM hardware with above average fringe benefits. **Contact: Jim Baker**

# Programmer (BASIC+)

**London** **c.£7,500**

An exceptional opportunity for someone with at least one year of commercial experience using BASIC+ to join a medium sized distribution company. A Network of 12 PDP 11/70's is being installed throughout the UK and will run a comprehensive accounting and management information system.
The position will initially involve working with a leading software house, developing the systems, but eventually the appointee will be based in new offices in North West London. Good prospects exist with the company and the successful candidate can expect to become an analyst/programmer in the immediate future. **Contact: Janet Chilvers**

**JAMES BAKER ASSOCIATES,**
**International Personnel Consultants,**
**32 Savile Row, London W1.**
**Tel: 01-439 9311.**
(1819)

**Recruitment LOGISTIX in Informatics**

# IBM Programmers

## France: Salary to £15K + Benefits

A vast multinational organisation with offices throughout Europe and the USA has an urgent requirement for four Senior Programmers to work on their mid-range IBM 370 installation in an attractive area south of Paris. Suitable applicants should have developed and maintained an on-line, real-time system in preferably an IBM environment. Of particular interest will be those who have written a data collection and interrogation system using CICS with DL/I. However, those applicants with relevant experience using any other IBM compatible TP monitor should not be deterred from applying as training will be given to suitable candidates.

Ref: L/25/A

# Datacomms Consultants

## Manchester & H. Counties: To £12K

One of the world's leading mini-computer manufacturers has an urgent requirement for Data Communications Consultants. Candidates will be required to have led a project team dedicated to the implementation of a large communications network. Knowledge of particular hardware is not required but 3-5 years' in-depth involvement and the implementation and support of automated telephony systems and software is a prerequisite. Successful applicants will be expected to assess customer requirements for telecommunications equipment, mainly voice but also data and telex. As the client base covers much of Western Europe, knowledge of German or French is advantageous.

Ref: L/25/B

# IBM & AMDAHL Systems Engineers

## German Speaking: Salary £20K + Benefits

A multi-national Company of US origin has retained **LOGISTIX** to recruit several IBM Systems Engineers and Programmers for its expanding German speaking operations based in both West Germany and Switzerland.
**THE COMPANY:** Our client, established in 1968, is an internationally renowned supplier of Data-Base and Teleprocessing systems. Today its operations are worldwide.
**THE PEOPLE:** To support its rapid expansion in Western Europe, the Company is seeking Senior Systems Engineers and Software Programmers for recently created permanent positions. Technically, you must demonstrate continuous and current experience in the implementation and support of Data-Base and Teleprocessing systems. Ideally, all candidates should have had involvement in the installation of software, systems generation, benchmarking and testing. Personal skills such as the ability to liaise effectively at both managerial and departmental level are highly desirable. Project management experience together with varied exposure to pre-sales activities, e.g. customer presentations in the form of user seminars, tendering and product demonstrations, will reflect in the already generous salaries on offer. Particular hardware experience should ideally include multi-user or large-scale IBM, Amdahl or other IBM compatible systems. It is a prerequisite to offer "Hands-on" software with IMS/DB-DC; CICS/VS; MVS or with the D.B. or T.P. software of an independent supplier such as — TOTAL and ENVIRON; SHADOW; IDMS and RAMIS. In view of the senior nature of these positions only candidates with (at least) reasonable German language ability can be considered.
**THE BENEFITS:** The higher than average salaries (even by Continental standards) reflect the prominence which our client places on the acquisition of these key personnel. Technical personnel receive a salary and other financial allowances commensurate with the Company's high expectations. Additional benefits include life and disability insurance and all employees participate in pension and medical plans.
**THE INTERVIEWS:** We will conduct preliminary interviews after which a Senior Company Representative will interview in either UK or Europe.
**To APPLY:** Please address all resumés and application forms under Ref: L/25/C.

# Information Consultants

## London: Salary to £14,000

Our client is a leading consultancy and communications product specialist, based in the centre of London. The rapid expansion within the market sector covering office automation and information science technology has led to an immediate requirement for additional Senior Consultants. Suitable applicants will be confident, well-presented and demonstrate the ability to lead project teams developing state-of-the-art software in the areas of electronic mailing, text and word processing. You should have current or very recent involvement with Systems Network Architecture preferably using IBM software and hardware and those who have knowledge of at least one DBMS will be particularly favoured by our client.

Ref: L/25/LD.

# COBOL Programmers

## Central London: Salary £6.5-8K

[illegible] renowned Software Products and Consultancy Group is seeking COBOL Applications Programmers to join a young and successful team working in Central London. Whilst our client has no preference for particular hardware experience, suitable candidates will most likely have current or very recent knowledge of IBM, DEC, ICL or [illegible] equipment. Database and/or on-line skills will be especially welcome but those who can offer only batch involvement should not be deterred from applying. This is an excellent career opportunity for young, ambitious applicants to gain experience with a variety of hardware or indeed to move into totally new applications areas.

Ref: L/25/E

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American Community Schools

## Great Expectations!

June's expecting (a baby in October — congratulations June, sorry to lose you!), which means that we're expecting to replace her with a first-class

## SENIOR COMPUTER OPERATOR/ OPERATIONS MANAGER

The job would suit a man just as well as a woman; someone in their early 30s with the right training, personality and experience — we have a Burroughs 80 machine so familiarity breeds content!

Apart from operating the computer yourself and being in charge of one other operator, we'll expect you to have the maturity to run the department; co-ordinating the work, supervising the care of the equipment and keeping in touch with the manufacturers in order to be up to date on the latest developments of the system's software and hardware. You'll also help to select and train any operators we may hire in the future, evaluating their performance and making sure they maintain a system log.

Our hours are 8-5 and our offices are very pleasant and comfortable — and just around the corner from South Kensington tube station in an attractive part of West London. As far as salary is concerned you'll have to help us figure that out yourself. But we guarantee you won't be disappointed.

If you're ready to use your operator skills and experience as a stepping stone to management, tell us about yourself. Write to Mrs O. Reed, American Community School, 5 Cromwell Place, London SW7 2JP, or telephone 01-581 0732.

(1567)

# Computer Operators and Trainees

Oil Industry — London

Marathon Oil U.K., Ltd.–one of the most successful organisations engaged in the exploration of oil and gas both overseas and in the North Sea are seeking experienced Computer Operators. Currently, one of our major projects is the development of the North Sea Brae Field, so considerable reliance is placed on our computer facilities – at the moment, these consist of Hewlett Packard and Datapoint mini computers though IBM 4300 series equipment is likely to be installed in London in 1981.

Our Datapoint installation is one of the largest of its type in the country, comprising Local Application Processors, VDU's, Graph Plotter, Digitizer, Remote Data Entry terminals and Data Communication terminals on line to our IBM 370/168s and Burroughs 8b800s in the United States. We're looking for men and women with experience on minis or small/medium mainframe machines–particularly those we've mentioned–and to cope with growth, we're expanding our UK computer operations to 24 hour/7 day working.

We'll go into details of shift patterns when we meet you, but the system is specially designed to give plenty of weekend leave.

**TRAINEES**

We also require a limited number of trainee Computer Operators, ideally aged 18-22 and educated to 'O' level standard in scientific or practical subjects.

Salaries and benefits are of the standard you'd expect from a progressive company and you'll be based in London, at our Marylebone Road Headquarters. For further details, contact:

Paul Wood, Marathon Oil U.K., Ltd.,
174 Marylebone Road, London NW1 5AT.
Tel: 01-486 0222.

MARATHON

AEROSPACE PROJECTS
WEST GERMANY

# Analyst Programmers/ Systems Programmers

DM 50,000 - DM 80,000

Science Systems Ltd., a systems house specialising in the scientific/technical areas of computing, are seeking to recruit a number of experienced personnel to work on advanced technology projects in West Germany.

Ideally candidates should possess a numerate degree and have had a minimum of two years programming experience in a real-time environment using FORTRAN and/or ASSEMBLER.

Exposure to any of the following hardware would be extremely advantageous.

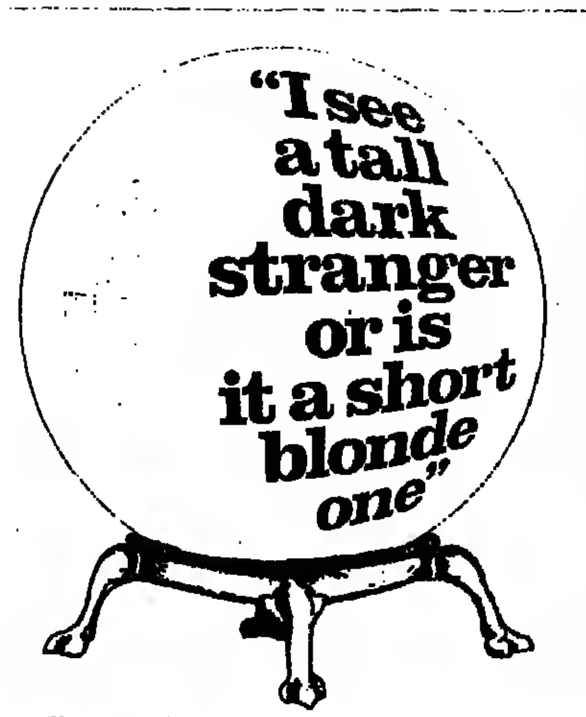
**SEL 32/70 series** — **HP 2100**
**MODCOMP 4/Classic** — **ITT 3200**
**SIEMENS 330** — **SIGMA 7/9**
**UNIVAC 1100** — **HONEYWELL 6 or 66**

Apart from the attractive salaries, Science Systems offers removal and other expenses plus the normal benefits that are associated with a progressive company.

**Contact Derek Ashley at:**
**SCIENCE SYSTEMS LIMITED**
**60 Kings Road, Chelsea,**
**London S.W.3.**
**01-581 1481**

science systems

(1648)




Fortune tellers can give a fascinating insight into your future – but they can never give guarantees.

However, our client in Surrey has a computer development programme which really is guaranteed.

It's currently based on a Univac 1100/81 which will be upgraded to an 82.

And a big development programme includes some Univac V77 minis plus around 100 user terminals and a superb new building.

It's all pretty exciting and it means that the DP staff team is going to have to develop along with the hardware.

At the moment they're seeking Analysts and Programmers who have had at least two years experience.

All positions offer really attractive salary/benefits packages with prospects for a bright future.

And that's not star-gazing – that's a guaranteed commitment.

For full details just phone 01-546 6230 and speak to Jason Palmer or Theresa Farns.

Or write to Bull Holmes Bartlett Ltd. (PT), 45 Albemarle Street, London W1X 3FE

**Bull Holmes Bartlett**

(1574)

# COMPUTER WEEKLY CLASSIFIED

01 261 8028/8097/8019

the newspaper computer people rely on

WEST GLAMORGAN COUNTY COUNCIL
COUNTY ENGINEER & SURVEYORS DEPARTMENT

## ASSISTANT TECHNICAL OFFICER (COMPUTER)

Ref. SVP/08/009
Pembroke Buildings, Swansea

The opportunity exists for the right sort of person to assist in the support, maintenance and development of a wide variety of computer applications within the technical environment of the County Engineer's Department.

The successful applicant will also be required to help meet the challenge of the current transfer to a new range ICL 2960/2972 computer and the successful commissioning of an ICL 8702 VDU cluster as well as the continuing use of various teletype devices. The Department also owns an off-line drum plotter.

The person appointed will also be involved in user liaison and training. He/she will probably hold a degree or equivalent qualification in Civil Engineering, mathematics or computing, and proven experience in computer systems although not necessarily related a County Highways Department. A sound knowledge of FORTRAN is essential and previous experience of GEO [illegible] would be a definite advantage.

A professional qualification is preferable but not essential.

The commencing salary will be related to qualifications and experience.

Salary: £6,838 to £8,087 per annum.

For application forms write to: The County Clerk, Central Personnel Unit, The Guildhall, Swansea, enclosing a large stamped addressed envelope. Closing date for the receipt of completed application forms 5th July, 1980.

ANY FORM OF CANVASSING WILL DISQUALIFY
PLEASE QUOTE APPROPRIATE REFERENCE NUMBER (1670)

**ANALYST/PROGRAMMERS**
**London IBM Cobol/PL1/Mark IV**

Tel: Roger Barnes on 01-628 4200
4&6 Copthall Avenue, EC2R 7DA

SDA

# NEXT WEEK NORTHERN RECRUITMENT FEATURE

**Advertisers are reminded that the next Computer Weekly Northern Recruitment Feature will be published on June 26 and will highlight career opportunities in the North.**

Space reservations should be made as soon as possible to:

**Owen Kelly — Manchester — 061-872 4211**
**Julie Hannaford — London — 01-261 8002**

Copy Deadline PM Friday before

**COMPUTER WEEKLY**
THE INDUSTRY'S WIDEST READ AND MOST REQUESTED NEWSPAPER

# Computer Operator

**LONDON SE1**

A vacancy in our Computing Branch on the South Bank offers a chance to be involved in a multi-processor installation supporting batch processing and an extensive communications workload.

Hardware consists of ICL mainframes – 1 x 2960/10 and 1 x 1903T with communications through a 7904, and scanner. A 'special purpose' 7905 with connections to an IBM 370/168 is also installed. We are a George 3 site (DME on 2960 of course) but transition to VME/B is planned for 1981/2.

Current applications utilise real-time, batch, MOP and RJE services and there is a developing involvement in supporting distributed processors of various manufacture. Altogether an attractive work situation for those motivated by job content. Prospects for advancement within Operations are good, either to supervisory positions or to technical support.

Applicants should have a good general education with 1 year of ICL operations experience. Knowledge of George 3 is a distinct advantage with VME/B an additional bonus, although comprehensive training in the new operating system will be arranged. The applicant must be available for shift working.

**Salary range: £5,620-£7,223 pa**

Further details may be obtained from Derek Johnson on 01-261 2327 and applications quoting vacancy Number 1079/80/ES should be forwarded to the Personnel Officer (Recruitment), Bankside House, Sumner Street, London SE1, as soon as possible.

Central Electricity Generating Board
SE Region

Specialists since 1971 in UK and International computer appointments. We have many other jobs on our files and offer a career counselling service to computer professionals.

OCC Computer Personnel Ltd
16 Bedford Row London WC1R 4EB
Telephone 01-242 9356 Telex 268652
*also at*
*4 Church Lane Nantwich Cheshire CW5 5RQ*

Member of Computing Services Association

## Permanent Vacancies

This is a list of some of our current vacancies. If any are of interest why not give us a ring (24-hr. service), or, if this is inconvenient, why not fill in the coupon below and send it to us at the address given.

**PROGRAMMERS**

1. Bucks. RPG2 Progs. — to £8K
2. N.W.10. RPG2 Progs. 2-3 yrs. — to £7.5K
3. Surrey. IBM Assembler — to £11K
4. London. D.G. Progs. — to £9K
5. St. Albans. IBM DOS/VS COBOL — to £10K
6. Middx. IBM Assembler Syst. Prog. — £7.5K
7. W. London. RPG2/COBOL + mini — c£7.5K
8. E.C.2. Snr. Progs. Burroughs H.W. — c£7.5K
9. S.W.1. 1-2 yrs. COBOL IBM — c£6K
10. E.1. Snr. Prog. 3-4 yrs. PL1/Assembler
11. S. London. Prog. COBOL, FORTRAN, PRIME, Honeywell, IBM H.W. — to £8.4K
12. Middx. COBOL/PL1/BASIC — sal. neg.
13. Surrey. R.T. Progs. 2 yrs. Assembler, D.B. exp. useful — to £8.5K

**ANALYSTS**

14. Milton Keynes. DEC Analyst Designer — to £9K
15. Herts. Analyst Progs. Manufacturer — £8.5K
16. W.1. Anal. Prog. 2 yrs. comms + 1 yr. COBOL
17. Middx. Senior S/A commercial — to £10K

**SENIOR**

18. Feltham. SW Dev. Manager. ICL — to £5K
19. Manchester. Branch Support Manager — £10.5K + car
20. Ilford. Project Leader Commercial — £10K
21. London Consultants—Financial Systems — to £12K
22. London Consultants — Military Systems — to £12K
23. Surrey. Prog. Dev. Supervisor, IBM DOS/VS COBOL-Assembler
24. Middx. Project Leader Anal. Prog. — c£10K

**OTHERS**

25. Hants. Training Staff DEC equipment — to £8K
26. Middx. Sales Point of Sale Product — £14K + car
27. W.C.1. OCC consultant — c£10K + car
28. Bournemouth. Trainee Salesman Manufacturer
29. Herts. H/W, S/W Tech. Author

**OVERSEAS**

30. Switzerland. Mini/Micro + German — to £18K
31. Holland. Assembler + Mini/Micro
32. Holland. IBM Communications Consultant — to £20K
33. Holland. DMS 1100 Specialists — to £20K
34. Jeddah. DOS/VS Systems Prog. — to £15K + car
35. Saudi. Various — Commercial to EDP — to £18K
36. Kuwait. IBM OS/DOS/ICL 2900 COBOL Anal. Progs. — to £16K
37. France/Germany. IBM Assembler + French/German
38. Germany/Belgium. Process Control Engineers — to £18K
39. Germany. R.T. Mini/Micro. — to £15K
40. Scandinavia. IMS Specialist
41. Nigeria. General Manager — £17K+
42. Dharan. H/W + S/W Engineers — to £18K
43. Germany. JCL Writer, IBM DOS/VS Power VS — £11-14K
44. Canada. Honeywell Level 68 Anal. Prog. GCOS IMS TDS — $25,000
45. France/UK. Mini/FORTRAN — £8.6-9K

I am interested in the following job number/s ..........

Name ..........

Address ..........

Tel. Home .......... Work ..........

OCC COMPUTER PERSONNEL
16 Bedford Row, London WC1R 4EB

(1613)

# DP MANAGER

**CRAWLEY, SUSSEX**
**c. £10,000 p.a.**

Unilock Partitions, a member of the Unilock Group of Companies and the leading European supplier of relocatable office partitions, is currently expanding its computer operations. An ICL 2903 is already well established and an advanced computer graphics system will be installed very shortly.

To assist in the operation of these systems and their further development, a DP Manager, who will report to the Computer Services Manager, is to be appointed. Applicants should be in the age range 25/35, have experience of Systems Analysis and Design and preferably a knowledge of Fortran IV or RPG II.

The successful candidate can look forward to earnings in excess of £10,000 per annum, together with participation in contributory pension and private medical schemes. If appropriate, relocation assistance will be provided.

Applicants should send CV with full personal and career details to:

John Devine
Computer Services Manager
**UNILOCK PARTITIONS**
Gatwick Road, Crawley, West Sussex
RH10 2UN

# University of Petroleum and Minerals Dhahran, Saudi Arabia

Our configuration consists of an IBM 3033 and an IBM 370/158 operating under VM/CMS-SPF, MVS/TSO-SPF and CICS with telecommunications/tele-processing networks. We now need the following:

**SYSTEMS PROGRAMMERS**

With a B.Sc degree, 3-5 years experience and a knowledge of Assembler and PL/1. Experience gained in a higher educational environment would be an advantage.

**PROGRAMMER/ ANALYST-ACADEMIC/ RESEARCH SUPPORT**

With [illegible] or engineering B.[illegible] with Fortran and/or [illegible] experience. A working [illegible] of HSL, SSP or any of the following packages is desirable: CHESS, [illegible], STRUDL, CSMP. The job will involve CAD and [illegible] [illegible] as well as [illegible]

**ADMIN. D.P. SUPPORT**

With a B.Sc degree and 3-5 years experience in business D.P. The work will involve systems development and maintenance using CICS and VSAM.

The University offers regular renewable 2 year contracts, tax free competitive salaries and allowances, plus air transport to and from Dhahran for each 2 year tour. Housing in kind will be provided if available, otherwise a cash allowance will be made for outside living. There are 45 days paid vacation and generous holidays.

Please apply as soon as possible with a detailed C.V. including home and office addresses and phone numbers to:

University of Petroleum and Minerals, c/o Gabbitas-Thring Services Limited, Broughton House, 6, 7, and 8 Sackville Street, London W1X 2BR.
Tel: 01-734 0161.

# Sales Support -Data Communications

£8,000 + car

Data Logic is probably the fastest-growing systems group in the UK. Our Data Communications Division is looking for suitably qualified electronics people to provide vital sales and technical support to existing and potential users of our modems, multiplexers and network management systems.

This is an opportunity to become fully involved in the sales function including negotiation and presentation to prospects. You may be working at the moment in pre-sales support or field service engineering, or you may be running data communications networks on the user side. Whatever your background it is essential that you demonstrate the ability to keep pace within a marketing oriented group which aims to further improve on its 50% annual growth rate.

Applicants must be qualified to at least ONC level, preferably HNC or equivalent, in electronics engineering or a similar discipline. HM forces qualifications are also welcome. Full training will be given on Data Logic products.

Based at our Marylebone Road headquarters in London, you will operate throughout the UK with emphasis on the South East of England. The salary is supported by a wide range of benefits.

Write with full career details, or telephone for an application form, to: John H. Wilson, Personnel Department, Data Logic Limited, 29 Marylebone Road, London NW1. Tel: 01-486 7288.

Data Logic

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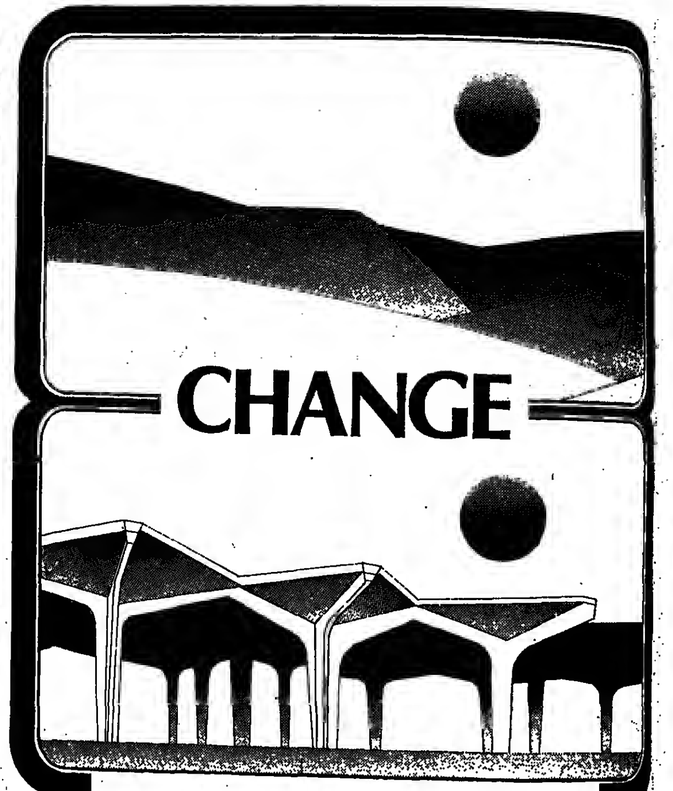


## Your part in it.

You will be working with one of the most advanced computer systems worldwide, which currently comprises of twin IBM3033's 158 and 168. You will be a member of the sophisticated EDP department which serves one of the world's leading oil companies. You will have access to an extensive in-house training department which ensures that employees are au fait with the very latest DP developments. You will be living in a developed complex based on the ARABIAN Gulf, and enjoying excellent recreational facilities, free medical treatment, and generous paid holidays amongst the many benefits. You will earn a starting salary commensurate with your qualifications and skills. If you match the requirements listed below ring PETER MADAMS quoting CW5/6 A/456 now.

**PROGRAMMER/ANALYSTS** — To £14,000 NET

At least 3 years programming experience in PL1/COBOL or FORTRAN. A knowledge of IMS Database and teleprocessing applications are desirable.

**PROGRAMMER MARK IV** — To £15,000 NET

A sound knowledge of Mark IV systems, preferably in an engineering environment.

**SYSTEMS ANALYSTS** — To £16,000 NET

Commercial and Scientific.
At least 5 years experience in DP with proven experience in conducting feasibility studies for a range of commercial and scientific applications.

**SYSTEMS DESIGNERS** — To £17,000 NET

At least 2 years proven Design experience especially in the areas of Materials Planning, and Transportation Systems.

These positions are open to men or women preferably educated to degree level on a one year single status renewable contract.

(1431)

Computer People London

VLI group

VLI House 66-69 St Martin's Lane London WC2N 4JS
Recruitment for systems
01-240 1488

Computing Services Association

# SYSTEMS ANALYSIS.

There's a growing shortage of experienced personnel within the computer industry.

And to help ease this shortage, the Manpower Services Commission, under TOPS, the Training Opportunities Scheme, are sponsoring a fifteen week Systems Analysis course, starting September, 1980 at Bolton Institute of Technology.

WHAT DO YOU LEARN? Training covers systems analysis and design, basic statistics, business administration, accounts, computer theory and programming.

Successful completion of the course leads to the National Computer Centre Basic Certificate in Systems Analysis, which will equip you for employment as a Trainee Analyst/Programmer.

WOULD IT SUIT YOU? You should be aged between 25 and 35,* and have a mature outlook, a logical mind and the ability to work in a highly technical environment. Previous experience of business or commerce would be advantageous.

You should have O' levels in English and Maths plus at least one 'A' level.

You will be required to attend a pre-course aptitude test and interview.

TOPS ALLOWANCES. All tuition is free and you'll receive a TOPS tax-free weekly allowance. Travel and/or lodging allowances may also be paid.

# WE'LL PAY YOU TO QUALIFY.

Find out more by sending the coupon to Lesley Harris, Manpower Services Commission, Training Services Division, District Office, Churchgate House, Churchgate, Bolton.

I am interested in the Systems Analysis Course.
Name _____ Address _____
_____
Telephone _____

TOPS TRAINING OPPORTUNITIES SCHEME

*ALL COURSES ARE OPEN TO BOTH MEN AND WOMEN WHO HAVE HAD FULL TIME EDUCATION FOR TWO YEARS AND DO NOT HAVE BEEN ON A TOPS COURSE IN THE LAST TWO YEARS

# R & D Systems Software Manager

**N. London** **c.£13000 + Cortina Ghia**

Our client is a worldwide leader in the supply of advanced computerised systems to the colour printing and graphic arts industries. Current projects are multi-disciplined using state-of-the-art technology in minis, micros, lasers and complex optical systems. The company is seeking to appoint a suitably qualified candidate to this new staff management position.

Ideally you should have had experience in a position of responsibility in at least one software development project. You will be aware of the need for adequate standards and be capable of specifying those required. You will be required to advise and consult with existing engineering managers on development methodology and systems. You will also be capable of providing technical guidance to development programmers within the division.

Additionally, candidates who have DEC PDP11 experience, knowledge of microprocessors and experience in providing technical career planning/counselling would be advised to apply.

This is an excellent opportunity to contribute to an experienced management team at a significant level with the attraction of seeing the lessons of experience adopted in practice.

Apply in confidence to Terry Harvey by sending an up-to-date c.v. or telephone for an application form, evenings Great Missenden (02406) 4705, or daytime as below:

HR **Harvey Recruitment**
Executive and Computing Personnel Consultants 500 Chesham House, 150 Regent Street, London W1R 5FA. Tel: 01-734 5351 (1650)

# SALES EXECUTIVES

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BASIC £8,000 NEG. + COMMISSION GUARANTEE ON QUOTA £16,000

Our Client is the UK minicomputer division of a major American company whose products are recognised to be of a very high quality and whose reputation for service, reliability and support is second to none.

They . . . are a Fortune 500 Company
have been Established over 40 years
have declared a Dividend to Shareholders for 26 consecutive years.
have a Turnover £97.8M (6 months ending January, 1980).
have an Average growth 70% per annum.

They are offering you a tremendous opportunity to share in their success and can offer:

Average order value £80,000.
Sales Quota £350,000.
Commission paid 50% order, 50% delivery.
Outstanding Pre/Post Sales Support.
All Software developed in U.K.

If you have experience in Commercial or Technical applications and feel equal to this challenge and live in the South East or North then call now!

Ref: CS 1161

(1666)

AB EXECUTIVE (KINGSTON)
01-549 6441, 24-hour service

# Great Opportunity!

For a career minded salesperson to realise their full potential. For the right person we offer:

- a ground floor opportunity where you can make a substantial contribution,
- a dynamic growing company,
- the scope to develop our marketing and selling activities,
- a product of the '80s — minicomputers and commercial packages,
- location in South East England (Croydon based).

## Sales Manager c.£15,000

We are a company providing the full range of computer services mainly in London and South East England. Our aim has always been to provide a professional service of high quality in all areas of activity.

We have recently started selling Data General minicomputers, with both general and industry specific packages. Our packages are written in COBOL and we are able to offer systems tailored precisely to our clients needs.

We are looking for an entrepreneurial minded salesperson who will make a major contribution to the development of our marketing and selling activities and the growth of our company.

You must be fully aware of the commercial real time minicomputer market and have a good appreciation of commercial systems.

An executive car will be provided.

Similar opportunities also exist in Birmingham and Luton.

For further information please contact BRIAN BATHGATE as below or outside office hours on Oxted 4571.

(1662)

FORCE 8 computer services
8 Mint Walk Croydon 01-680 3761

# We've got the Home Counties Covered !!

**Here are some of the many opportunities - they change daily, so contact us now.**

**NW London/Oxon-**
**Senior Analyst to £10,000**
An international publisher is seeking a senior analyst, with good systems design experience, preferably in an on-line or database environment, with the ability to motivate others.

**Slough -**
**Systems Analyst - to £10,000**
A major manufacturer is seeking a D.P. professional offering solid experience in analysis and D.P., preferably with a production bias, for an ambitious redevelopment project.

**Berks/Bucks -**
**ICL/DEC Technical Consultants c £10,000 + Car.**
A leading software house expanding its ICL and DEC customer base seeks candidates with good knowledge of ICL 1900/2900 or PDP 11 systems. Assembler languages, TP and on-line experience an advantage.

**West of London-**
**Sales Executives - £16,000 on Quote earnings + Car.**
Experienced mainframe and mini computer sales people are required to cover territories to West of London. These are exceptional opportunities for people with a successful track record in commercial, scientific or government selling. Basic salaries are up to £8,000.

**W6 -**
**COBOL Programmers to £8,000.**
Your chance to work on development of real time mini systems in a progressive installation, seeking programmers with at least 1 year's COBOL experience.

**W4 -**
**RPGII Programmers to £9,000.**
A successful consultancy, specialising in small IBM systems, have opportunities for RPGII Programmers who would enjoy a great deal of variety and client contact.

**NW1 -**
**DG Analyst or Programmer - Start £10,500.**
Prestigious user with well run, small department; a variety of systems on Eclipse and Novas. Client well known to us, strongly recommended. Near Euston/Northern Line.

**City -**
**Banking - 5 wks holiday + 5% mortgage. 'Forex' Business Analyst - c£10,000 + benefits**
to head up a small team, with emphasis on Foreign Exchange experience rather than D.P. and COBOL Programmer - c£5,800 + benefits for 1 year's experience, to join small, friendly team on above project.

**Engineering**

**Middlesex -**
**Electronics Engineers £6-£7,000 + Car.**
High calibre electronic engineers, 20-25 years, with analogue/digital experience are required to support two large system sites. Applicants must be prepared to work shifts and should be qualified to ONC/HNC level with relevant work experience.

**West London -**
**IBM DP Engineer £7,500 - £12,000.**
Highly experienced IBM engineer is required to work on large 370 site. Applicants must be prepared to work shifts and should be conversant with 158, 168 and 303X machines. Salary will be exceptional and commensurate with experience.

**Hertfordshire -**
**Test/Repair Engineers £6-£7,000.**
Experienced technician/engineers are required for production support and repair centre services. Experience of fault finding on PCB's is essential and will be rewarded with high salary and excellent career prospects.

**Thames Valley -**
**Software Engineer to £13,000 + Car.**
Required to take overall technical responsibility for a number of customer sites and with experience of generating and installing VM370 software, together with a knowledge of DOS/VS.

**Have we got you covered?**
*Our consultants work very hard with you when it's time to change jobs - that means we find out exactly what you want and only arrange interviews when you agree that requirement is of interest and suited to you. Firstly, we need to know about you, so 'phone, write or give your name etc. below and pop this advert in the post to us. We think you won't be disappointed.*

✻MARK ABOVE IF ANY JOBS ARE OF INTEREST TO YOU AND RETURN OUR ADVERT.

SOUTH OF THE THAMES — WE'VE REALLY GOT COVERED!!

Name .................................... Phone ....................................

Address ....................................................................... (1620)

**CAPP ASSOCIATES 01-686 9693**

Computer and Professional Personnel Consultants
**LONDON and MANCHESTER**
AMP House, Dingwall Road, CROYDON CR9 8XA

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**Institute of Basic Medical Sciences**

Applications are invited from Science graduates and/or other appropriately qualified persons for the post of Programmer/Terminal Supervisor for a PDP-11 Remote Job Entry Terminal in the Institute.

Salary will be on the University Scale 1B for "other" related staff at present £4402-£7410 per annum plus £740 London Allowance.

Further details are available from the Secretary of the Institute of Basic Medical Sciences, Royal College of Surgeons of England, Lincoln's Inn Fields, London WC2A 3PN, to whom completed applications should be made by 4th July, 1980.

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UNIVERSITY OF NEWCASTLE-UPON-TYNE
UNIVERSITY LIBRARY

**ASSISTANT LIBRARIAN (SYSTEMS ANALYST/PROGRAMMER)**

Applications are invited for a post of Assistant Librarian (Systems Analyst/Programmer) in the University Library. Applicants should be graduates with experience in Systems Analysis and Programming and preferably with some knowledge of minicomputer systems. The successful applicant will be concerned with developing the Library systems using IBM 370 and Systel Computers.

Salary will be at appropriate point according to age, qualifications and experience, on the Grade IIA scale £5,082-£10,484 per annum.

Further particulars may be obtained from the Senior Assistant Registrar (F.P.), The University, 6 Kensington Terrace, Newcastle-upon-Tyne NE1 7RU, with whom applications (3 copies) together with the names and addresses of 3 referees, should be lodged not later than 10th July 1980.
Please quote reference COM.W. (1419)

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FOR THE BEST PERMANENT AND CONTRACT JOBS IN THE NORTH OF ENGLAND
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Phone: 061-236 7318 or 7412
061-440 8034 (Home)

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Surrey Education Committee
**Brooklands Technical College**
Heath Road, Weybridge, Surrey
Department of Technology

## Lecturer I — Computer Science

Appropriate qualifications/experiance to teach Computing subjects GCE "A" level, C&G 747 and similar standards BEC/TEC Courses. Ability to offer Cobol/Data Processing techniques an advantage.
Salary Scale: Lecturer I —
£3777-£6499 (present); £4071-£7005 (w.e.f. 1.9.80).
Plus £177 per annum London Fringe Area Allowance.
All salaries under review as from 1st April, 1980.
Commencing salary dependent upon qualifications and experience.
Generous relocation expenses in approved cases.
Further details and application form from the Principal to be returned by TUESDAY, 1st JULY, 1980.

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*Directorate of Finance*

## Assistant Programmer

AP3/4 (£4,681-£5,784)

The Authority is currently developing programmes on its C.M.C. Reality Royale and applications are invited for the above post from persons with at least one year's practical experience in programming in a high-level language.

The postholder will be responsible under the direction of the Computer Programmer for the design and implementation of projects and for writing and adapting programmes.

Application forms and further details available from the undersigned, to be returned by 4th July, 1980.

Personnel Officer
North Devon District Council
Civic Centre
Barnstaple
North Devon

NDDC NORTH DEVON DISTRICT COUNCIL

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## *Analyst/ Programmer + ICL System Ten*

Austin Knight is the UK's largest recruitment advertising agency with its headquarters in the West End of London and a network of regional offices throughout the UK and overseas.

We operate two ICL System Ten's with a total of 110K of memory, 13 VDU's and 3 line printers. Applications include an on-line order processing system, accounting and management information systems. Further developments are planned which may include the addition of extra hardware to incorporate the regional network into the main system.

The successful man or woman will assist the D.P. Manager in all aspects of his work and deputise for him in his absence.

This is a genuine career opportunity for an Analyst/Programmer keen to broaden their experience in what is a particularly stimulating environment and who is now ready to accept further responsibility.

Applicants should have a sound background covering at least 3 years in systems design and programming, preferably in Assembler.

A competitive salary is offered together with an attractive range of benefits.

For further details telephone, or write with career details to: Ron Westcott, D.P. Manager, Austin Knight Limited, London W1A 1DS. Tel: 01-437 9261.

**Austin Knight Advertising** AK LONDON

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**PROGRAMMERS**
London IBM Cobol/PL1/Mark IV
SIDA

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**PRIME NEW YORK**
01-606 8900 day
0604-711209 eve. & weekends

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HORIZON Exploration Limited

COMPUTER OPERATIONS - LONDON
£5,280-£7,200

Horizon Exploration Limited is a rapidly growing Company in the field of world-wide seismic survey work, and we are now seeking to recruit

## COMPUTER OPERATORS

to work on attachment in London.
A seven-day, 24-hour shift system is in operation for which shift and travelling allowances are paid.
The Company offers membership of its pensions and Life Assurance schemes and free B.U.P.A. membership in addition to excellent general terms and conditions.
A thriving Sports and Social club exists within the company.
Salary levels inclusive of allowances are in the range of £5,280-£7,200.
For an application form please contact:

The Personnel Department
Horizon Exploration Limited
Horizon House, Azalea Drive
Swanley, BR8 8JR.
Tel: Swanley (82) 68011.

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GROUND FLOOR OPPORTUNITY
**ANALYST/PROGRAMMER**
RICHMOND — £7K to £8K + CAR

An exciting opportunity with a small, successful British Company headed by Top Computer People. They have a rapidly expanding customer base for their Micro Systems which already enjoy Market Rating (UK & USA) and EXPANSION — OPPORTUNITY. YOU WILL ENJOY: — Meeting people (mostly first-time users). Broad applications experience — Friendly supportive management. Total project involvement — Packages and customised applications in many different industries.

For an ambitious ANALYST/PROGRAMMER with ... background the benefits will include excellent salary — Company car — Training on Micro Systems PLUS unbeatable promotion prospects.
RING FOR DETAILS NOW
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# MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611
**8 a.m.-6 p.m.**
Thurs., 19 June-Wed., 25 June

# IBM
# SYSTEMS PROGRAMMERS
## tune your careers here!

We are a large twin IBM installation in central London at the forefront of IBM technology offering software house and bureau services to companies within the group.

The mainframes support over 600 terminals and 400 access lines.

Our current requirement is for IBM OS SYSTEMS PROGRAMMERS with a variety of experience to join one of our support teams.

Experience should include some of:
- ★ ASSEMBLER, PLI, ADABAS
- ★ MVS
- ★ JES2
- ★ IMS
- ★ TSO
- ★ TELEPROCESSING
- ★ SYSTEMS TUNING
- ★ LARGE DBMS MANIPULATION

The extensive benefits package includes 22 days' holiday, 4 extra statutory holidays, pension scheme and travel concessions (inc. Europe).

Salary will be in the range of £7,000 to £10,000.

In the first instance contact Terry Bate on 01-637 9611.

---

# Take this opportunity to develop your talents

# SENIOR PROJECT PROSPECTS
## in Essex Salaries to £10K

*In addition to excellent promotion prospects and generous benefits you will be involved in stimulating technical developments and have every opportunity to extend your skills in an invigorating atmosphere.*

This major manufacturing company, situated close to London and the delightful Essex countryside, now needs senior project people to further expand their management services facility.

Based on a large ICL network the MIS function operates on a bureau and software basis to operating units within the company.

*Contact Terry Bate on 01-637 9611*

**PROJECT LEADERS**
to head a team concerned with EDP techniques — to identify where they can be used to advantage in the designing and implementation of a wide range of commercial applications.

**SYSTEMS ANALYSTS**
to work in a project team developing systems mentioned above and having a minimum of 2 years' experience.

**ANALYST PROGRAMMERS**
with 2 years' EDP experience and a knowledge of COBOL gained in a manufacturing environment.

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

**MANAGEMENT & EXECUTIVE SELECTION**

# The United States of America

***New York $27.5K-$30K***
*A Financial and Management Services Corporation require MCS/DC ALGOL Programmers with experience of Burroughs 4700/4800 hardware to work on a variety of financial systems in their Manhattan offices. Communications knowledge will be advantageous. Interviews will be held w/c 30th June 1980.*

***New York $27K-$30K***
*A large software house require Programmers with a sound CICS background gained in either the software or applications area to assist in the development of a number of major systems.*

***Minneapolis $30K-$35K***
*A large commercial organisation require MVS Systems Programmers with IMS experience for development on their IBM 370/158 and 3031 hardware.*

*All these assignments are on a twelve month basis and the earnings packages will carry a considerable tax advantage.*
***Please ring 01-240 2441 or mail the coupon.***

*I am interested in American vacancies.*

*Name*_____

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*Mail (no stamp) to FREEPOST, Computer People International, VLI House, London WC2N 4BR.*

**Computer People International**
VLI House 68-69 St Martin's Lane
London WC2N 4JS
01-240 2441
Recruitment Consultants
VLI group



# MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611
**8 a.m.-6 p.m.**
Thurs., 19 June-Wed., 25 June

## ICL System 4/70 ENGINEERS

### c £15K + 2L Granada

*Capitalise on your present experience whilst investing for the future*

A unique opportunity hes occurred for an experienced ICL 4/70 engineer to use his current knowledge whilst cross-training to both IBM and Amdahl's current mainframes.

If you are a Senior/Support level engineer well experienced on both the 4/70 and 4/72 our client can offer you a solid future.

**Contact Peter Gorton or Howard Wynne on 01-637 9611 for details.**

## PDP ENGINEERS

### experienced up to 11/70 or VAX

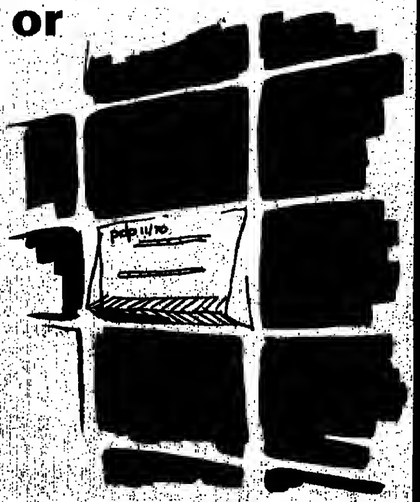
**HERE IS AN OPPORTUNITY TO MOVE TO AN IMPORTANT MANAGEMENT POSITION**

We heve been reteined to seek e cepeble end competent ENGINEER who possesses in-depth knowledge of the obove systems end who now wishes to develop menege-ment skills.

We are looking for en individuel cepable of controlling a project end edyising et senior menegement level. The right cendidete will possess initiative end be able to epply his equipment end industry knowledge to this project management role.

The company is based in Hertfordshire end is part of a £100 million organisation; they are fast moving end offer a stimu-lating environment for an engineer to develop management skills.

A very generous remuneretion peckage will reflect the importance of the poeition; a company cer will be provided and full relocation expenses paid where appro-priete.



**For further discussion please call Howard Wynne immediately on 01-637 9611**

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

**MANAGEMENT & EXECUTIVE SELECTION**

# IBM

# SYSTEMS DEVELOPMENT STAFF

## SOUTH HUMBERSIDE

Our client, a large, successful and profitable company wish to recruit a number of experienced systems development staff, to cope with the expanding requirement for computer services.

The current 370 installation is to be replaced by a 4300 series machine with a network of 8100's and projects cover commercial, financial and manufacturing areas using batch, on-line and database techniques.

The company is located by the coast in an area of low cost housing and offers a range of benefits to successful candidates as follows:

- Free BUPA
- Relocation Expenses
- Flexi time
- Mortgage assistance and bridging loan facilities could be available to suitable applicants
- Comprehensive Training
- Excellent Career Prospects

### SYSTEMS ANALYSTS

Candidates with design experience covering a minimum of two years on commercial or financial systems and a programming background are required to work in a stimulating environment on a wide variety of projects. Ideally you will also have had some experience in the design of on-line systems. *(CW8063)*

c £6400

### APPLICATIONS PROGRAMMERS

We are looking for programmers who have had at least three years experience using COBOL. Candidates with both COBOL and ASSEMBLER will be considered for senior programmer positions. If you have also used CICS and/or DL1 this would be to your advantage, however comprehensive training will be provided. *(CW8064)*

c £5800

*Interested candidates are invited to contact Roger Pickin by telephone or in writing via the Harrogate office or evenings and weekends on Matlock (0629) 2609 to arrange a confidential discussion.*

**Ivor Norton Management Services Ltd**

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Harrogate 66828

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24 HOUR ANSWERING SERVICE
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# contract assignments

**North West:** Ring 061-491 1666

ICL 2900 Large Systems Systems Analysts (VMEB)
ICL 1900 COBOL GIII+ Analyst Programmers (maintenance work)
Univac 1100 series FORTRAN Programmers — long term contracts
Hewlett Packard 3000 COBOL/IMAGE Analyst Programmers
Hewlett Packard 3000 COBOL/IMAGE Project Leaders
IBM 370 Systems Analysts & Programmers with TOTAL Detsbase
IBM DOS Systems Analysts
IBM 360 ASSEMBLER COBOL OS/VS1 Lecturer
IBM FORTRAN Analyst Programmers

**North East:** Ring 0532-34941

Maths or Physics Graduate with ALGOL, FORTRAN & BASIC+ for Analyst Programmer position
Burroughs 1800 COBOL Analyst Programmers
Burroughs Large System ALGOL/DMS2 Analyst Programmers
PDP MACRO 11 Realtime Programmers
PDP MUMPS Programmers
GEC 4000 CORAL Realtime Programmers
Honeywell Level 66 COBOL Programmers

**Scotland:** Ring 041-221 1600

IBM OS Systems Programmers
IBM PL1 IMS Programmers
IBM COBOL IMS Programmers
PDP MACRO 11 Realtime Programmers

Please provide information about contract assignments.
North West ☐ North East ☐ Scotland ☐
Name _____ Tel.Nos. _____
Address _____ (Day) _____ (Ev/Wkd.) _____
Mail (no stamp) to FREEPOST, COMPUTER PEOPLE NORTH Stockport House, Stockport Rd, Cheadle, Cheshire, SK8 2YD

Computer People North
VU group



# MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611
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Thurs., 19 June-Wed., 25 June

# THINKING ABOUT TOMORROW MADE US BIG TODAY

## Software Sales People £11–15K + car

London area

The leading multi-national software organisation that markets a wide range of systems software for IBM users from DOS, VS to MVS; is planning to expand their operation by increasing its sales force to not only cater for their large existing customer base, but generate new name business. With an admirable reputation for excellent products and services our client makes this a tempting opportunity for sales people already selling successfully in the DP industry.

**IF YOU'RE TALKING ABOUT SELLING SOFTWARE PRODUCTS INTO THE RAPIDLY GROWING IBM MARKET YOU HAVE GOT TO BE THINKING ABOUT TOMORROW, CALL TONY McGRATH TODAY ON 01-637 9611.**

We have been assigned to find an experienced Demonstrator/Trainer who is capable of establishing a small team responsible for demonstrating to and supporting distributors of our client's products

# *senior international demonstrator/trainer*

## *£8½k + car*

As the Company is a major name in the "electronic office of the future" you will have the opportunity to be involved with some of the liveliest and brightest marketing people in Europe today.

Come and have a chat with us if you have experience in the word/text processing field or with a computer manufacturer and speak any European language. Contact Tony McGrath on 01-637 9611.

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

MANAGEMENT & EXECUTIVE SELECTION

OPERATIONS CONTROLLER - c. £7,000 - Slough

Part of this successful corporation's development is the manufacture and marketing of a new generation of super minis. An outstanding opportunity has arisen for an Operations Controller to maintain their in-house installation and liaise with software support and pre-sales divisions.-

A smart, intelligent operations person (preferably from a mainframe background) can expect to move into operational or sales support areas

For further details please contact Penny Stock on 01-240 1456
PS 11405/CW18/6/80
(1022)

TECHNICAL SUPPORT - ICL 2904 EXEC 2s - Hertfordshire - £5,750

An expanding company in Hertfordshire requires an operator who has the ability to write Macro's, correct JCL errors and restore files etc.

The installation runs under a three shift system at present but this will possibly be reduced to two. A starting salary of £5,750 can be expected along with the obvious career opportunity this particular position can offer.

Please telephone Sue Foulser on 01-240-1456 for further details
SF 10753 CW 18-8-80

N.W. KENT - MVS/JCL WRITER - £6,500 + 5% Mortgage

A major finance Company will shortly be enhancing their operating system and are looking to recruit a JCL Writer with 3 years MVS & OOS experience.

3031 mainframe running under MVS/JES 2. Days only after initial period on shifts.

Tel. Sally Ann Bradley on 01-240-2441.

TWO OPERATORS — Any Hardware Background Generous Relocation Package - £5,500+

Tired of commuting? Two intelligent operators, with any hardware background, are required to work at a sophisticated installation in rural Cambridgeshire which operates a two shift system. Although you will be working within a relaxed atmosphere and with friendly people, your career prospects will not be ignored.

A generous relocation package is given to you together with the advantage of being able to buy brand new property for as little as £20,000.

For further details please ring Sue Foulser on 01-240-1456.
SF10414 CW 18-8-80

SYSTEM 34 SUPERVISOR/OPERATOR - Central London - £6,000

A well qualified systems operator, preferably from a System 34 or 3 background, could look forward to some very exciting projects at our client's Central London based System 34 site.

The post is seen as an important operating position where you will also take responsibility for a small team of data prep. staff. Future plans include involvement in the establishment and smooth running of additional remote sites.

Age is irrelevant as long as you can demonstrate a real sense of maturity.

Please contact Kay Stebbings on 01-240-1456 now for more details.
KS 11404 CW 18-8-80

هكذا منه الأجل

Computer People

VLI House 68/69 St Martin's Lane London WC2N 4JS

Recruiting for Clients VLI group

UNIVERSITY OF BATH

Applications are invited for the post of

LECTURER IN COMPUTING

The appointee will be expected to make a significant contribution to the research activities in the School of Mathematics.

The starting salary will be set in the lower part of the range £5,062-£10,484.

Particulars and application forms available from Personnel Officer, University of Bath, Bath BA2 7AY. Closing date for applications 14th July, 1980. Ref. 80/97. (1054)

BRUNEL UNIVERSITY

Lectureship in Data Processing

Applications are invited from those suitably qualified to contribute to an educational programme involving commercial data processing and real time systems.

Further details from Professor Pitteway, Department of Computer Science, Brunel University, Uxbridge UB8 3PH.

Salary in the Lecturer scale £5,062-£10,484 plus £740 London Allowance with FSSU/USS benefits.

Application forms from the Establishment Secretary, Brunel University, Uxbridge UB8 3PH, or telephone Uxbridge 37188, ext. 49. Closing date: 18 July, 1980. (1083)

BOX Nos.

Box number replies should be addressed to.

Box No. .....
c/o Computer Weekly
Dorset House
Stamford Street
London SE1 9LU

TRANSDATA LIMITED

DUE TO RAPID EXPANSION

requires

SALES EXECUTIVES

c. £12,000 + COMPANY CAR

The Terminals and Communications Division of Transdata Limited, a leading British manufacturer of intelligent data terminals and micro based computer systems, urgently needs professional sales people to sell an exciting range of terminals and data communications systems.

Increased demand for these products has created vacancies in the following areas:

☆BERKSHIRE, HAMPSHIRE and the WEST COUNTRY
☆THE MIDLANDS, BIRMINGHAM and STAFFS
☆LEICESTERSHIRE, CAMBS and EAST ANGLIA

The above positions are open to both men and women, preferably aged 25-35.

If you would like to join a young, dynamic sales team and can offer a minimum of 2 years' related sales experience in exchange for high earnings and excellent promotional opportunities, then telephone BOB LEDWELL on 01-403 5115, or write to him at: BATTLEBRIDGE HOUSE, 87-95 TOOLEY STREET, LONDON SE1

DATA PROCESSING MANAGER

Our Client, a well-known International Engineering Organisation situated close to the A1 in East Anglia, are seeking a D.P. Manager for a department using a Data Terminal linked to an IBM 4341.

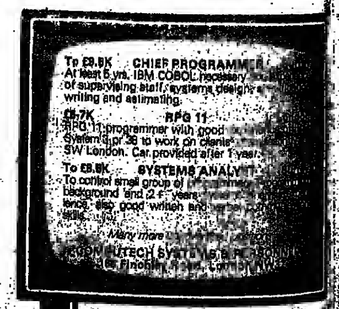
The hardware and systems at present being developed will provide interesting and challenging prospects including implementing and maintaining a highly sophisticated production control system.

Candidates with a sound practical background should be familiar with Cobol and have the maturity to be involved with Management on a day-to-day basis.

This is an ideal opportunity for a person (male or female) seeking a good secure position in a friendly organisation who now wishes to settle in a country environment close to excellent facilities. The salary envisaged is circa £8,500 p.a. with benefits and re-location assistance in line with modern Company practices.

Please write, in the strictest confidence, giving brief career details to date to:

J.A.B. Stevens,
Tisbury Resources Advertising,
186a Bedford Road, Kempston, Bedford MK42 8BH.
Please treat as a covering letter. Companies to whom you do not wish your application to be sent.




OCC Contracts Personnel

Holland

H.L6 TPS
U.1100 DMS TIPS

Programmers, Analyst Programmers and Designers are required for the above projects in both the software and applications areas. Early availability preferred for some contracts.
Rates are attractive and negotiable.

For further details, please contact:
Roger Allington, quoting FL/27.
OCC Contracts Personnel
1 Shootersway Park
Berkhamsted
Herts. HP4 3NX
Tel: Berkhamsted 2299
(day/evening)

04427-2299

Gwent college of higher education

SENIOR COMPUTER TECHNICIAN (PROGRAMMING)

Applications are invited for the above post in the Advisory Unit. The successful candidate will be required to take part in the design, implementation and maintenance of main-frame and micro-computer systems. Program-writing experience is required in BASIC, COBOL and preferably, other high-level languages, under [illegible]

Application forms and job specification may be obtained from and should be returned to the Personnel Officer, Gwent College of Higher Education, Coldra Court, Newport, Gwent NP9 1XJ, quoting the name of the post concerned. Closing date, [illegible]



# MANAGEMENT & EXECUTIVE SELECTION

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LOOK AT THE BENEFITS!

**Modern Offices**
Set in rural surroundings North of London

**Excellent Salary**
Up to £9k to start and under review

**Company Car**
Above average

**BUPA** Subsidised

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Contributory

# This has to be a little special . . .

LOOK AT THE POSITIONS!

**Pre-Sales Business Application Support**
Feasibility studies, presentations, applications package support

**Technical Customer Support**
Tailoring, hardware/software evaluation, technical seminars

**Operating Systems Support**
Performance measurement, trouble shooting, software evaluation

**Communications Support**
Pre-sales tech. support, tailoring

LOOK AT THE COMPANY!

A prestigious name, a division of one of the world's largest communications giants specialising in advanced DP and DDP terminal systems using tomorrow's mini-computer technology today.

**We're choosy! If you're special, let's get together, contact Faye Ogilvie or Terry Bate on 01-637 9611**

## Cobol Programmers, Senior Programmers, Analyst/Programmers, Analysts

# DATABASE PROJECTS

## In Central London

up to

**£9½K**

depending on experience

An international engineering contracting company, located in Central London, with progressive ideas in computing has vacancies for programmers, senior programmers, analyst/programmers and analysts.

Using Univac 1100 mainframe with intelligent terminals, current work includes the formation of a corporate database system as well as other on-line projects.

The expansion programme has created excellent opportunities to join this company and work in a dynamic team environment.

Any Cobol background could be acceptable for the right candidates, but knowledge of database and Univac will be an advantage.

The usual large company benefits apply including paid overtime, pension scheme, travel assistance and relocation expenses.

**In the first instance ring Terry Bate on 01-637 9611**

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

MANAGEMENT & EXECUTIVE SELECTION

# YOUR NEW JOB IN THE SOUTH

## SENIOR SYSTEMS ANALYST
## SURREY c. £10,000

**SUBSIDISED MORTGAGE ★ SPORTS & SOCIAL CLUB**

Our Client requires an ambitious, mature, outgoing person to work in an internal consulting group, offering systems support to the subsidiaries of the organisation. Suitable applicants will have at least 4 years' systems experience, with responsibility for at least one major system from feasibility to implementation. Financial or banking knowledge with experience of planning, project control and management methods are essential for this post. Additional knowledge in equipment selection, large IBM mainframes, real-time and/or Database would be desirable.

Candidates applying for this position must be prepared to travel overseas.

**Contact Mike Bettle**

## SOFTWARE EXPERTISE
## ESSEX to £10,000

Opportunities exist to travel in Europe and U.S. if you have experience in any of the following areas:—

- ★ Loaders
- ★ Operating Systems
- ★ Data Communications
- ★ Macro Processors
- ★ Compilers
- ★ Linkage Editors

**Contact Tony Hatherall**

## ANALYST PROGRAMMER
## NORTH KENT c £8000

You only need to have good DOS COBOL experience to join an exciting project involving the conversion of an existing HONEYWELL system to a "state of the art," on line system based on an IBM 4331 using CICS/DL1. Knowledge of COPEX is a bonus, but not essential.

**Tel: Tony Hatherall**

## SYSTEMS ANALYST
## RURAL SURREY c £8500

Our Client, leaders in the field of passenger travel, are transferring from ICL to UNIVAC hardware and seek a sound Systems Analyst with general commercial experience to assist in new systems development involving DATABASE and teleprocessing techniques.

**Tel: Mike Bettle**

## PROGRAMMER
## KINGSTON c £6000

**★STAFF DISCOUNTS ★SUBSIDISED CANTEEN ★SOCIAL CLUB**

Programmers with a minimum of 18 months' COBOL have an opportunity to join a small team involved with development work. Candidates applying should have sound experience gained in a commercial environment, further knowledge of NCR mainframes would be desirable, however, by no means a prerequisite.

**Tel: Mike Bettle**

## ANALYST/PROGRAMMER
## CROYDON c £8000

**SUBSIDISED MORTGAGE — BONUS SCHEME**

Are you an experienced Analyst who still enjoys using your programming skills? If so, an opportunity exists to become involved in interesting development work on a new IBM 4341, with the added bonus of full training being given in the use of CICS and DL1.

The Company is based in Central Croydon offering excellent shopping facilities, and easy access to both East and West Croydon main line stations.

**Tel: Mike Bettle**

## ANALYST/PROGRAMMER
## KINGSTON c £7500

**★STAFF DISCOUNTS ★SUBSIDISED CANTEEN ★STAFF SOCIAL CLUB**

An opportunity exists for an experienced Analyst/Programmer to become involved with interesting development work with a highly successful Company based in Kingston-Upon-Thames.

Candidates applying for this position will have sound analytical experience coupled with a solid background in COBOL programming. Our Clients are expanding their D.P. function and intend their future development to be directed toward on-line and DATABASE.

**Tel: Mike Bettle**

## OPERATOR
## SURREY c £5500

One of the world's leading consumer product companies require an operator with a minimum of 18 months' experience using DOS POWER A/S.

The Company are currently utilising an IBM mainframe supporting an expanding T.P. network.

**Tel: Sally Ann Bradley**

Computer People South
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VLI group

01-240 2441

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# MANAGEMENT & EXECUTIVE SELECTION

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# SALES PEOPLE
# £11-£17k +CAR

- ★ *career progression*
- ★ *innovation*
- ★ *financial rewards*

A major computer manufacturer known for its technological excellence throughout the world is continually increasing its sales force to market not only their existing products but also their new innovative ones that cover several fields: data processing, word processing, advanced business systems and scientific and technical.

If your background covers any of these areas our client would like to talk to you about your future within their organisation. Opportunities exist in the South East, Midlands, Manchester and the North and Scotland.

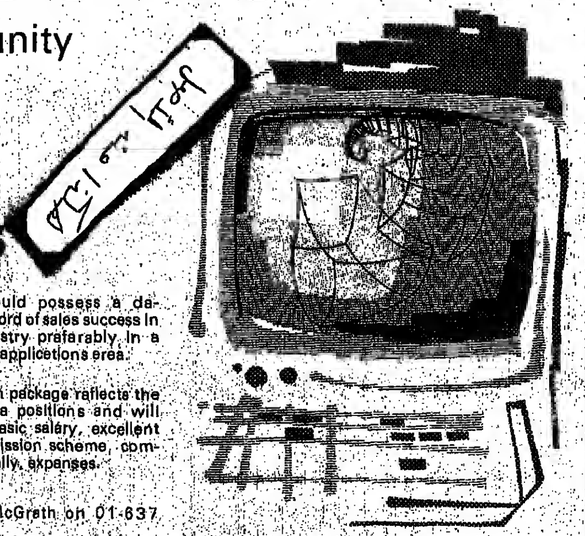
Naturally, comprehensive sales and product training courses are provided.

For a detailed discussion about this opportunity contact Robin de Rouen or Tony McGrath on 01-637 9611.

# senior sales executives

— the outstanding opportunity of the 80s. In the fastest growing market sector of the computer industry

## colour graphics



One of the leading manufacturers and distributors of COLOUR GRAPHIC DISPLAY TERMINALS and systems in the U.K., has asked us to identify and select two senior sales executives to fulfil vitally important positions in the South-East and the Midlands/North.

You will be responsible for the professional development of established major accounts and also for obtaining new business in a wide market sector as the products range from low cost graphic terminals to one of the most advanced systems available today.

Candidates should possess a demonstrable track record of sales success in the computer industry preferably in a technical/industrial applications area.

The remuneration package reflects the importance of these positions and will consist of a high basic salary, excellent "no ceiling" commission scheme, company car and, naturally, expenses.

Contact Tony McGrath on 01-637 9611.

Suite 20[illegible]/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

**MANAGEMENT & EXECUTIVE SELECTION**

FACILITIES MANAGEMENT BUSINESS SYSTEMS CONTRACT STAFF SUPPORT RECRUITMENT CONSULTANCY
SOFTWARE PACKAGES COMPUTER SECURITY FACILITIES MANAGEMENT
CONTRACT STAFF SUPPORT RECRUITMENT CONSULTANCY BUSINESS SYSTEMS SOFTWARE PACKAGES

# HEXAGON computer services

## STAR CAREERS

### SENIOR PROGRAMMER/ DESIGNER HP 3000
**Victoria** **c £9K**
★ 1 year HP +, 3 years' programming
★ Take the project, estimate it, run it, finish it!
★ Insurance Company
*Quote Ref: DJ80169*

### CICS EXPERIENCE— ANALYST/PROGRAMMER
**Central London** **c £9K Neg**
★ International Financial House
★ Small Department, but high powered
★ Good experience, good benefits
*Quote Ref: DJ80150*

### ANALYST PROGRAMMER— SYST. 34s
**Wembley** **c £7½K**
★ RPGII, COBOL essential
★ The job — Real Time Interactive, Telecommunications
★ Possible international travel
★ 2/3 years' programming, some contact with analysis
*Quote Ref: DJ80145*

### PROJECT LEADER
**Financial + Business**
**Central London** **to £13K**
★ Take a NEW project from start to finish
★ A good financial/Stock Exchange background
★ Good prospects
*Quote Ref: DJ80170*

### ANALYSTS — Pref IBM
**Hounslow** **to c. £9K**
★ Two Analysts required for International Engineering concern
★ At least 2 years' systems analysis experience
★ Prefer (1) financial (2) Production Control backgrounde
★ Good company benefits and a wide range of experience to be gained
*Quote Ref: DJ80171*

### SENIOR PROGRAMMERS/ CONSULTANTS
**Berks** **to £7½K Neg**
★ 3 requirements with well-established Software House
★ (1) Mini-based Cobol experience
(2) Team Leader experience
(3) Software House experience
★ Good benefits and a very wide range of experience for the right candidate
*Quote Ref: DJ80173*

### ASSEMBLER PROGRAMMER— IBM
**North Surrey** **to £7K**
★ Development work for on-line systems
★ 9 months plus, commercial experience.
★ Heavy emphasis on training to work on TP applications
★ Good experience, good company
*Quote Ref: DJ80172*

### SENIOR PROGRAMMER/ ANALYST
**Hants./Surrey borders**
**c £8K under review**
★ 4-5 years' DP experience inc. some systems work
★ A good knowledge of Cobol (pref. Honeywell)
★ To help develop new systems in a small project team
★ Profit sharing, non-contributory pension + free life assurance
★ European travel
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★ 5 years' DP experience
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(1883)

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***Contact Peter Gorton for your application form, on return of which a full company report will be sent to you.***

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## *It won't be all plain sailing!*

There'll be difficult times *(every job has them)*
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## New IBM 4331

## Surrey

## (Full Relocation)

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**DOS SYSTEMS PROGRAMMER**

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Following company systems/technical training in Sweden, you will have responsibility not only for software techniques and standards, but also for providing technical guidance to the Applications Teams.

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# COMPUTER ENGINEERS

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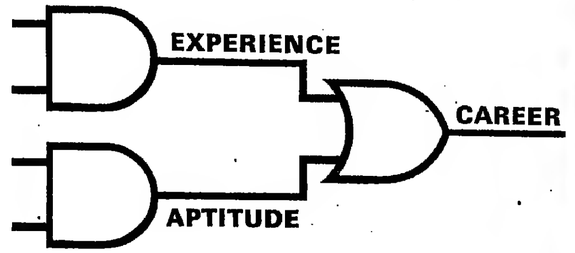


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**MANAGEMENT & EXECUTIVE SELECTION**

(1100)

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## (Mini Computers and Data Communications)

South Herts. c.£8,500 plus car

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51 pour COMPUTER WEEKLY

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## Now is the time to switch to a whole new world of business knowledge

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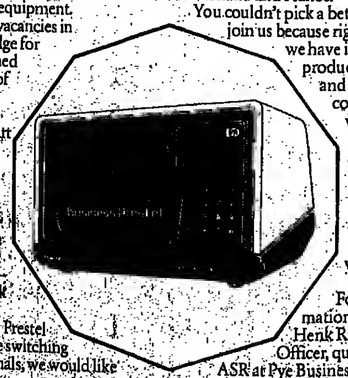
We currently have vacancies in London and Cambridge for enthusiastic, determined people who, because of their appetite for hard work, have the capacity to become part of the Sales Management team.

If you have gained HNC/HND or equivalent in telecommunications and have a proven sales record in the following areas – data modems, network management systems, Viewdata systems and Prestel terminals and message switching equipment and terminals, we would like to hear from you now.

Your main responsibilities will be to promote sales of new and supplementary business and advise customers of new products which will include sales presentations. There may be occasional travelling to Holland and France.

You couldn't pick a better time to join us because right now we have important new products in the pipeline, and as well as offering competitive salaries we also offer 5 weeks' holiday, staff discount on all the Philips' range of products, sports and social club and relocation expenses where necessary.



For further information, please contact Henk Riethoff, Personnel Officer, quoting reference ASR at Pye Business Communications Ltd., Cromwell Road, Cambridge or telephone Cambridge 45191.

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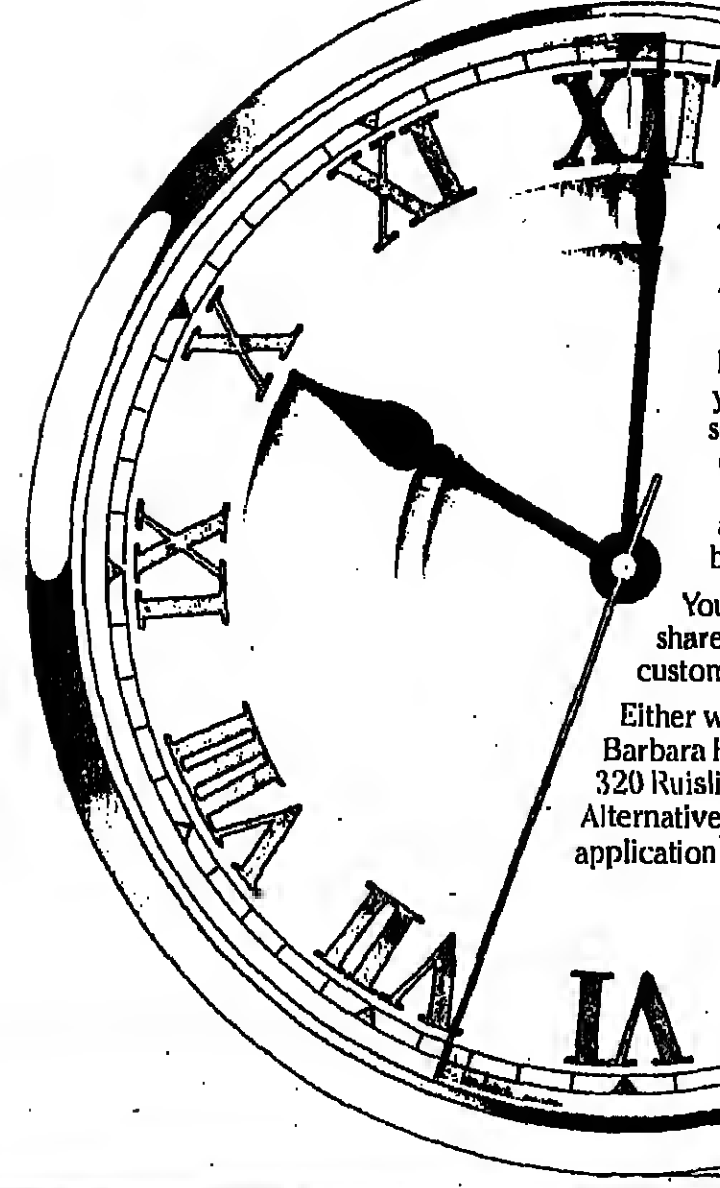


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## SYSTEMS ANALYSTS

*who want to do something more advanced than payrolls and accounting routines*

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**£7,500 to £10,000**

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Please ring us in confidence for an initial talk, quoting ref. 672, or leave a message on our answering machine after hours and we will contact you.

(1651)

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Language Design
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Re-location expenses reimbursed.

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**The Job** — Software development for an important new research project. You will be responsible for the acceptance of new computer equipment and the building of a system based on a F100 MICRO-PROCESSOR.

**The Location** — A Research Establishment in an area of outstanding scenic beauty on the S.W. Coast with reliable house prices. Generous re-location assistance is available.

**The Person** — Ideally you will have gained your experience in a technological environment, be able to work alone producing and implementing ideas successfully. A programming background in Fortran is essential and MACRO 11 knowledge beneficial.

**The Rewards** — The opportunity to work in a stimulating environment and participate in an important project at the forefront of modern technology on a salary of up to £9,000.

Also Required

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A University graduate with some experience of electronics and mini-computers. Salary to £7,000.

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We market a broad portfolio of high performance magnetic disk products, predominantly to OEM outlets, including the TRIDENT range of removable disk pack drives, the DIABLO range of cartridge disk drives and the MARKSMAN range of micro-controlled Winchester drives.

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**UNITED KINGDOM and EUROPE**

Initial training will take place in CALIFORNIA and subsequent sales activity will either involve the United Kingdom or European countries such as FRANCE, ITALY, SPAIN and SCANDINAVIA.

The opportunities for career development are considerable with excellent prospects for suitable candidates to

**Advance into Management**

within the first two years of employment.

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for
### COMPUTER AIDED DESIGN

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One of our key areas is the **Computer Aided Design** activity which is essential in the design of integrated circuits.

We now offer you the opportunity to join us at the forefront of the micro-electronics world — we need someone (male or female), with programming knowledge and experience in a scientific application, preferably Fortran or Algol, to join our CAD team. The work is varied — ranging from creating systems to programming on dedicated computers — 128K word SEL 32/55 computers with Tektronix graphics.

You will probably have a degree in a relevant scientific subject with an appreciation of electronics and be able to demonstrate to us a practical aptitude in using computers.

Salary will depend on the experience you can offer us and there are excellent fringe benefits, including generous relocation expenses where necessary.

**Please write with details of your qualifications, experience and current salary to: John Wells, Personnel Officer, Mullard Southampton, Millbrook Industrial Estate, Southampton SO9 7BH. Or telephone Southampton (0703) 775533.**

Mullard Southampton

(1507)



**PROJECT LEADER**
C. £10,000-£13,000 — WEST LONDON
International manufacturing Company requires a top class Project Leader or Senior Systems Analyst. Must have designed and implemented at least 1 major system.

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FORTRAN Programmers required for Technical applications. Junior and Senior Programmers with 2 years FORTRAN experience on Technical applications for numerical analysis, computer-aided design, etc. Good degree in Computer Science, Mathematics, Engineering or any Scientific subject.

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**SYSTEMS ANALYSTS + PROGRAMMERS**
S. Neg. — MIDDLESEX
We have various Companies in the Middlesex area, who are seeking Systems Analysts and Programmers with COBOL, ASSEMBLER, FORTRAN or RPG 11. Good experience essential.

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C. £7,000+ — HIGH WYCOMBE
Well known Company is looking for a Programmer to join their Data Processing Department. Must have at least 18 months to 2 years programming experience, using RPG 11. Will consider COBOL Programmer willing to be retrained.

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## THE SALES BIT

# What makes people tick

OFTEN an order can be lost owing to the buyer apparently acting in an irrational manner. The salesman is confounded. "Why on earth did he do that? I don't understand it."

Every angle was considered, all the possibilities explored, the alternatives analysed in a logical manner, yet the buyer chose not only some other product, but one which was clearly not the best for the job.

Had the job of selection been his, the salesman would certainly not have made the same choice, even to the exclusion of his own product — so who can blame him for losing the order?

This kind of situation is more common than one might initially think, but rather than being an irrational act on the part of the buyer is often an error of judgment by the salesman.

When you think about it, such unexpected behaviour confronts us all from time to time, sometimes in a business environment, but often within the social context. You create a strategy or make an approach based on what you consider to be the likely reaction, and suddenly you are shocked, horrified, distressed, disappointed, perplexed or even annoyed, to discover that your ideas are rejected in preference to an alternative which is so clearly inappropriate, inadequate, inferior, unsuitable, impractical, too expensive, self-indulgent or even stupid.

Yet the fact remains, you have been rejected, the decision has been made against you and it's difficult to get it reversed (but not impossible!)

So why do people often appear to act in such an inconsistent and illogical way? The answer is that they usually don't — at least not from their own point of view!

One of the big mistakes we all make in life is to expect, consciously and subconsciously, other people to work to the same set of rules as ourselves; that their thoughts and reactions in a given situation will be the same as our own. What we may consider to be a minor and transient phenomenon can have an impact upon others which is both profound and permanent.

On the other hand, our own momentous and unsolvable problems may be seen by others as trivial matters with an obvious and simple solution.

To a great extent this must be an amalgam of our individual chemistry, parental influence, environmental and social conditioning, formal education, influence of the media, personal experience and the shadow of the church flung from the Middle Ages, all of which contribute to the way we react to a given situation. We all appear to have an infinite capacity to produce a unique reaction to an endless number of variable situations.

In other words, it is very difficult to judge how any person will react in a given situation, despite the apparent logistics involved.

There is, of course, no precise way of solving this psychological problem. All one can do is try one's best to avoid falling into the trap of expecting people to do what one would do oneself in the circumstances. The nearest one can get is to work hard at getting to know the real person behind the facade — what motivates them, what do they like, fear, want, expect, know, etc.

Someone once said facetiously that if you want to anticipate the reaction of a woman, first judge what she will do, then expect the opposite. That is a reasonable guideline, but hardly a province monopolised by the female of the species.

**TRADER**

## Puzzle Answer

THIS little venture serves to illustrate various "properties" that every square must have. Set out in brief, these requirements are: (1) No square can end in 2, 3, 7 or 8; (2) all squares have a digital root of 1, 4, 7 or 9; (3) no number of the form 3n + 2 can be a square; (4) if the last digit of a square is 5, then the figure 2 must precede it; (5) no square can be made up entirely from odd digits; (6) if a square ends in 6, the preceding figure is always odd.

Of the 10 numbers given, only the sixth does not infringe one or other of these rules — and it is in fact the square of 50,125,240.

## Economics of message switching

THE user's view of message switching systems in private communications networks is given in a new publication from ITT Business Systems explaining the economics of such systems. Spokesmen from four companies of different sizes and operating in unrelated fields comment on the economic benefits of message switching within their own organisations. Copies of the publication are available from Publicity Department, ITT Business Systems, Lion Buildings, Crowhurst Road, Hollingsbury, Brighton.

## New company

A NEW company, Advanced Media, has been formed to market floppy discs, disc packs, magnetic tape, ribbons and similar items. The address is Unit H, St Antony's Way, Faggs Road, Feltham, Middlesex TW14 0NH, Tel: 01-751 2136.

## Going to town

MOVING into town from High Wycombe, MGE Management Services is now located at 111 Wardour Street, London, W1. The new telephone number is: 01-439 9617.

## On the move

AS a result of the continued expansion of its services to engineers and designers, Frazer-Nash (Consultancy) has moved to larger premises at River Cottage, 2 Lower Teddington Road, Hampton Wick, Kingston upon Thames, Surrey, KT1 4ER, telephone 01-[illegible].

# HOLLAND VIA I.A.

Industrial Artists has more challenging and rewarding staff positions on offer:

**ANALYST/PROGRAMMERS** with a good knowledge of COBOL are required, for a variety of commercial projects with particular emphasis on freight forwarding and general shipping systems.
Hardware comprises **IBM 370/168 Amdahl V7 and 3000 Series.** Operating under **OS/VS 1/2, DOS/VSE** controlled by **VM 370.**

**SYSTEMS ENGINEERS** with communications software experience are required for group management positions within a large software development division.
Experience of communications driver utilities, together with a good overall hardware/software appreciation.
Preferred applicants will possess an accredited academic qualification in computer science, control engineering or similar subject.

**GRADUATES** with a minimum degree in computer science or similar subject who wish to join a software development team, with an International Computer Manufacturing Company, are invited to submit their curriculum vitae for consideration. An outline of source material studied will assist in our evaluations.

**COBOL PROGRAMMERS** to work on a major conversion project are required for immediate assignments.
A variety of systems are currently being converted to run on **IBM 4000 Series** hardware, operating under **DOS/VSE.**
Special conversion tools utilise **IBM 370/158** hardware running under OS/VS1.

**COMPUTER OPERATORS** with experience of **IBM 370** and **303X Series** systems are required for various locations.

We would like to hear from **ANALYST/PROGRAMMERS** with direct experience of computer typesetting systems; applicants should also have a knowledge of **DEC/PDP 11** hardware, operating under **RSX 11/M.**

**TECHNICAL AUTHOR,** basically electronics with some digital hardware and software knowledge essential. Experience of medical instrumentation advantageous but not mandatory.

Excellent salaries are on offer, including generous concessions already negotiated with the Dutch taxation authority, four weeks' paid holiday per annum, paid national holidays and certified sick-time; a holiday bonus, plus the full support of the administrative staffs based in our Dutch offices.

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required for September
**Department of COMPUTER STUDIES**
(based at Elstree Way, Borehamwood)

## LECTURER II

Must have Data Processing experience, preferably at a Systems level and a knowledge of COBOL. To join a team developing a BEC TEC Higher National Certificate Course with a strong Data Processing bias.

## LECTURER I

With a knowledge of Basic and COBOL or Computer Operations of a medium to large and main-frame in a Data Processing environment.
Assistance with removal expenses in approved cases.
**Forms and further details from the Principal at the above address (telephone: Welwyn Garden 25318, ext. 21).**
Closing-date Monday, 30 June. (1867)

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## COMPUTER SHIFT LEADER

Person required to lead a team of operators responsible for the Centre's computers.
Equipment currently installed consists of an ICL 1903T running under GEORGE 3 and MAXIMOP, and a dual-processor Prime computer system running under PRIMOS and PRIMENET and supporting 64 terminals. Applicants should be educated to at least "A" level standard and have experience of operating in a medium to large computer installation. A two-shift system is worked, and the salary will be in the T3 scale, £4581-£5130, an additional 14% shift bonus is also payable.

Further details and application forms from the Deputy Administrator, Oxford Polytechnic, Headington, Oxford OX3 0BP.

(1608)

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# the jackpot

## GREAT VACS!!!

### OPERATOR/ SENIOR OPERATOR
**TO £6,000 INC.**
**ESSEX**
If you have one year+ Honeywell Level 64 exp. we have just the job for you. An added bonus is a two-shift only system (NO NIGHTS). This commercial company offers usual large company benefits, including an insurance scheme. Ring now. CW 25/1

### SOFTWARE/ COMPILER DESIGNERS
**£7,500 TO £11,500 (+ CAR)**
**W. LONDON AND NORTHERN HOME COUNTIES**
Do you consider you really know (or would like to know) how mini and micro software really work? If you have Assembler level, Macro, Machine code, Interface and Compiler experience, then please telephone us now. We have 14 vacancies in this field (working for manufacturers) for well-qualified personnel (please note a car is provided for 2 of these jobs). CW 25/2

### ICL OPERATORS
**TO £5,500**
**HOUNSLOW**
This well-known commercial company requires operators with two years+ 1900 exp. There is a three-shift system. Applicants must have their own transport. Benefits include free lunch and free life assurance. CW 25/3

### CONTRACT PROGRAMMERS
**UK AND OVERSEAS**
**£450 P.W.**

| | |
|---|---|
| PDP 8 PAL 8, Mid-Sussex | 3 mths. |
| Sys 34 RPG II, Herts. | 3 mths. |
| 1900 Plan, Essex | 3 mths. |
| COBOL G3, Mid-Herts. | 3 mths. |
| NCR Neat 3, West London | 3 mths. |
| Coral 66 Prog., Herts. | 6 mths. |
| IBM Sys Software, Germany | 6 mths. |
| IBM Cobol DOS, Holland | 6 mths. |

### SALES SUPPORT
**TO £6,000 + CAR**
**LONDON, MIDLANDS, MANCHESTER AND HOME COUNTIES**
We have five MINI computer manufacturing companies with offices around the country who require people with the confidence to deal with clients in a pre- and post-sales situation. All vacancies require a programming background on minis and the jobs will provide an exciting and satisfying career. Plus a Support Manager job in Manchester. CW 25/5

### MICRO PROGRAMMERS
**£5,500, £8,500, £10,500+**
If you have two years or more experience on any lookalike 8080 micro then please give us a ring. Many of our clients are dying to meet you and tempt you with large sums of money. CW 25/6

UCA Recruitment Consultants
**UNIVERSAL COMPUTER ASSOCIATES LIMITED**
01-995 3883 (01-958 6138 Evenings)
Data Express House, 3 Prospect Place, Heathfield Terrace, Chiswick W4

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American Community Schools

## Great Expectations!

June's expecting (a baby in October — congratulations June, sorry to lose you), which means that we're expecting to replace her with a first-class

### SENIOR COMPUTER OPERATOR/ OPERATIONS MANAGER

The job would suit a man just as well as a woman; someone in their early 30s with the right training, personality and experience — we have a Burroughs 80 machine as familiarity breeds content!
Apart from operating the computer yourself and being in charge of one other operator, we'll expect you to have the maturity to run the department; co-ordinating the work, supervising the care of the equipment and keeping in touch with the manufacturers in order to be up to date on the latest developments of the system's software and hardware. You'll also help to select and train any operators we may hire in the future, evaluating their performance and making sure they maintain a system log.
Our hours are 9-5 and our offices are very pleasant and comfortable — and just around the corner from South Kensington tube station in an attractive part of West London. As far as salary is concerned you'll have to help us figure that out yourself. But we guarantee you won't be disappointed.
If you're ready to use your operator skills and experience as a stepping stone to management, tell us about yourself. Write to Mrs. O. Reed, American Community School, 5 Cromwell Place, London SW7 2JP, or telephone 01-581 0732. (1887)

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## ★ MIDLANDS ★
## ★ COMMERCIAL PROGRAMMERS ★

HONEYWELL - COBOL
IBM - PL/1 or COBOL
**Permanent or contract, 3-6 month assignments**
Opportunities also available for candidates with other qualifications.
Contact: Tony Dowman on 021-622 6234, after 7 p.m. 021-427 2871.

**Fraser Williams Computer Consultants**

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# Senior Auditor
## Computer Systems Appraisal
WEST COUNTRY up to £9686

The attractive city of Bath – with fast access to some of Britain's finest leisure and sporting areas – this could be your environment working for South West Gas. This position will enable you to sharpen your professional skills on a sophisticated computing installation handling over 700,000 customers, 12,000 stock items and 5,000 personnel records as well as very many other application areas.

As a Senior Auditor in our DP team we will expect you to be at home with accounting practice – but more important is at least three years computer experience, including the writing and testing of programmes.

You will probably be a graduate who has worked on high volume processing. Career prospects within the Region and the gas industry cannot be less than first class, for the right person. Salary will be in the range of £8374 to £9686, plus the benefits normally associated with a large progressive organisation. These include an excellent sick pay and pension scheme and, in appropriate cases, financial assistance in relocation to the Avon area.

A vacancy for an Auditor has also arisen and applications are invited from those with computer experience. The salary range for this post is £6275 to £7349.

If you wish to discuss the responsibilities of these posts telephone Mr. David Evans, Assistant Audit Manager (0225) 6114, or request an application form from: The Personnel Officer (Administration), South West Gas, Riverside, Temple Street, Keynsham, Bristol BS18 1EQ, Tel: (02756) 61717.

**SOUTH WEST GAS**

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## PROGRAMMERS
### FOR ENGINEERING AND SCIENCE

We are a specialist agency covering the field of ENGINEERING & SCIENCE.
If you have experience in the above areas using FORTRAN, ASSEMBLER, CORAL or any other Science language please contact RAY DARKER on CRAYFORD (0322) 51921 for a confidential discussion regarding your career prospects.
SALARY RANGE £4000–£10000 ALL AREAS
Staffhire (Spurham Ltd), 8 Crayford High Street, CRAYFORD, KENT

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**COMPUTER WEEKLY CLASSIFIED**
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the newspaper computer people rely on

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# SYSTEMS ANALYSTS
## CAMBRIDGESHIRE

Our client, a very highly regarded, successful and profitable company located in Cambridgeshire has vacancies in their Systems Development Department for hard working, self motivated individuals who are able to communicate at all levels.

Successful candidates will be offered salaries commensurate with their experience, be given considerable assistance with appropriate relocation costs and have every opportunity to further their career within the company. Excellent training is provided both on a general and specific technical level. Particular hardware experience is not required as applicants will be considered who have worked on any of the major mainframes and appropriate retraining provided.

***Contact Roger Pickin to discuss the vacancies further, in writing or by telephone during office hours at the Harrogate office and outside office hours on 0629-2609.***

### SENIOR ANALYSTS — to £10000
Candidates should have 3/4 years experience in the design of commercial/financial systems. Experience in the use of database techniques would be advantageous (CW/8057)

### ANALYSTS — to £8500
These positions offer excellent career development to young analysts who have about two years experience. Previous programming experience would be useful for some of the vacancies. (CW/8058)

### JUNIOR ANALYSTS — to £7700
Candidates should have at least one years analysis and/or design experience. A background either in programming or as a user of dp systems would be useful for these positions. (CW/8059)

**Ivor Norton Management Services Ltd** RECRUITMENT CONSULTING DIVISION

LONDON: 52, Shaftesbury Avenue, London W1V 7DE, 01 734 8862
HARROGATE: P.O. Box 63, Copthall Tower House, Harrogate HG1 1TS, Harrogate 86628
GLASGOW: 11 Bothwell Street, Glasgow C2 6LY, 041 226 4911
24 HOUR ANSWERING SERVICE (0423) 55311

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# Contract Opportunities
# London and the South

### SPECIALIST SKILLS IN LONDON & NORTHERN HOME COUNTIES

*IBM ADABAS DL1*
*IBM IMS PL1*
*IBM COBOL CICS*
*IBM MARK IV OS*
*HONEYWELL RPG2 COBOL*
*CORAL 66 GIII*
*CORAL 66 REALTIME*
*BURROUGHS 37/4700 COBOL*
*DATA MANAGER*
*PDP RMS 11 BASIC+2*
*ICL IDMS VMEB*
*UNIVAC 1100 COBOL TIP*

*If you'd like to join us on contract and have a minimum of two years' DP experience, please call in or telephone and ask for John Kelly, Barbara Wolsky or Angela Arnone on 01-836 8411.*

### SPECIALIST SKILLS IN THE SOUTH

*IBM IMS DB/DC COBOL*
*IBM SERIES 1 EDX EDL*
*IBM PL1 IMS*
*IBM Mk. IV COBOL*
*SYSTEM 34 MAAPICS RPG2*
*PDP RTL2*
*DATA GENERAL RDOS BUSINESS BASIC*

*We are the contract market leaders and pay top rates to ensure that we maintain our position. Contact us now to find out more details of the above vacancies.*

*Even if you do not possess the above experience, why not telephone to enquire after our many other requirements and discover more about the advantages of becoming a contractor.*

(1826)

**Computer People** | VLI House 68,69 St Martin's Lane, London WC2N 4JS. Ring 01-836 8411

Please provide information about contract assignments.
London ☐ South ☐
Name ____ Tel. Nos. ____ (Day) ____
Address ____ (Ev./Wkd.) ____
Mail (no stamp) to FREEPOST, VLI House, London WC2N 4BR